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Development of Video Learning Media Based on Robert Gagne's Theory (Nine Events of Instruction) in Informatics Subjects at Junior High School

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Abstract: One component that cannot be separated from the learning process is learning media. Learning media is an essential part of education, regardless of the curriculum, because it plays a crucial role in influencing the quality and success of learning. The Informatics subject is no exception, as it introduces computers to students. This introduction is the initial stage of informatics lessons. In presenting the learning process through computer application materials, good preparation is essential. An educator should do more than just coordinate students in front of the computer, use a loud voice to direct them, or write notes on the blackboard. They must wisely package the teaching materials to make learning enjoyable, allowing students to feel that the classroom is a place to explore while they learn to use a computer. This type of research is development and research (R&D) using the ADDIE model. Product validation tests were conducted by three validators: one material validator, one language validator, and one media validator. The product trial involved 30 seventh-grade students from SMPN 1 Siak Hulu, aimed at assessing the practicality of the developed product. The effectiveness test was conducted by administering pre-test and post-test questions to the students. The results of the video media development research showed a validation level of 86% for the material and 85% for the language, both falling into the very valid category. The product practicality results indicated a practicality level of 91%, also in the very practical category. The effectiveness test yielded a t-value of 16.4.

Keywords: Development; Informatics; Learning Videos; Media

Introduction

The Merdeka Belajar Curriculum has been officially launched by the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia (Kemendikbud Ristek RI). The main goal of the Merdeka Belajar Curriculum is to optimize the spread of education in Indonesia through diverse intraculicular learning. Supporting learning recovery is a key characteristic of the Merdeka Belajar Curriculum. Additionally, the Merdeka Belajar Curriculum integrates literacy skills, knowledge, abilities, and attitudes (U. Inayati, 2022). Education is the foundation for a nation's progress and determines the level of national competitiveness, which means the education sector must continuously strive to improve its quality.

The Merdeka Curriculum transforms the subject area of Information and Communication Technology (ICT) from a local content or skills focus to a main subject area at the junior high school level, named Informatics. The field of Informatics has been established as a compulsory subject for students to master in basic and secondary education. In the Informatics subject, it is hoped that students will learn how to develop their character as citizens of both the real world and the digital world. All learning elements in this subject are expected to sharpen students' critical and creative thinking skills and train them to connect one element of knowledge with another (Nabilah et al., 2022).

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In learning, various theories and learning conditions should be used to optimize the learning process. One of the learning theories that can be applied in the learning process is Gagne's theory, which expresses that learning is not a single process but a broad process generated by the growth and development of behavior, where behavior is part of the learning process. Learning is a multifaceted process that occurs in everyone and continues throughout life. Robert Gagne establishes a person's mental readiness to learn. He proposes the "nine events of instruction," which include structured stages in the learning process. This learning theory can help teachers, learning designers, and educational program developers understand the learning processes that occur within students, thereby influencing and facilitating the students' learning processes (Haqiqy et al., 2024).

In teaching activities, teachers must create a pleasant learning environment so that students do not become quickly bored or fatigued. Given the significant responsibility borne by a teacher, they must recognize that as educators who directly implement education, they are at the forefront of educational success. The use of learning media in the teaching process can inspire new interests and motivations among students during their learning experiences (Wulandari et al., 2023).

Research shows that learning outcomes acquired through visual means account for about 75%, through auditory means for 13%, and through other senses for about 12% (Cahyani et al., 2016). Elements present in video media include sound, text, animation, and graphics. With the use of video media, students are able to achieve competencies in cognitive, affective, and psychomotor domains, as well as enhance their interpersonal skills.

Learning video media is an audio-visual medium that can provide a visual display of objects in motion accompanied by natural or appropriate sounds (Qurrotaini et al., 2020). According to Carolin et al. (2020), educational video media is a combination of sound, text, and visuals performing electronic movements intended to enhance students' interest in learning. Learning video media cannot be separated from anything that can be used to convey messages (teaching materials), thereby supporting increased attention, interest, thoughts, and feelings of students in the learning process to achieve the goals of that process. Learning video media is an audio-visual medium that combines sound and images to explain concepts, rules, steps, theories, and ways to apply knowledge in learning (Norma, 2021).

In presenting the learning process through computer application materials for students, good preparation is needed. This involves more than just coordinating students in front of the computer, using a loud voice to direct them, and writing notes on the board. An educator must be wise in packaging teaching materials so that they become enjoyable for students, allowing them to feel that the classroom is a place for play while they are learning to use computers.

Various efforts have been made to improve Informatics learning in the classroom. However, there are still many issues related to education. One problem currently faced by the education sector in Indonesia is the weak learning process. The learning process in schools offers insufficient encouragement to students in developing their computer operation skills. If teachers cannot present material in an engaging and enjoyable way, students may lose motivation to learn. This observation aligns with other research findings that show low student motivation in Informatics learning because teachers have not been able to deliver material in an enjoyable manner (Jumaring, 2022).

The second reality pertains to the challenges teachers face in implementing Informatics learning. These challenges can be categorized into three parts: (1) the lack of teachers' ability to create lesson plans, (2) teachers' inability to prepare effective models and methods aligned with Informatics, and (3) teachers' inability to create or prepare learning media that supports the Informatics learning process. This finding is reinforced by other research that indicates teachers have not been able to prepare learning media that supports Informatics (Sudiana, 2019).

Based on the background of the problems explained, the author will undertake the development of learning videos based on Robert Gagne's theory (Nine Events of Instruction) in the field of Informatics at SMP Negeri 1 Siak Hulu, Kampar Regency. The learning videos based on Robert Gagne's theory are expected to enhance students' understanding of Informatics if they are designed well and aligned with the principles of effective learning processes.

Method

This research employs a research and development (R&D) methodology. R&D has become a common approach in the field of education since the 1980s. Borg and Gall are key figures who played a significant role in developing this method. R&D is not only used to test educational theories but also to create effective educational products, such as teaching materials and learning media. Additionally, R&D plays an important role in improving the quality of education through a continuous evaluation process (Yuliani & Banjarnahor, 2021).

This research develops a product, namely instructional videos based on Robert Gagne's theory (Nine Events of Instruction) for the Informatics subject

in junior high school through the use of the ADDIE development model.

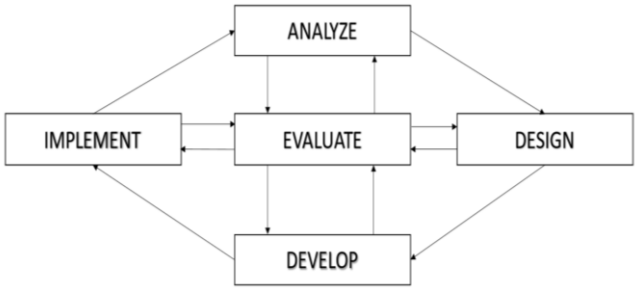

Figure 1. Stages of the ADDIE Development Model

The ADDIE model is a systematic approach used in the development of teaching materials. This model consists of five interrelated stages: needs analysis, instructional design, material development, implementation, and evaluation. Each stage in the ADDIE model is designed to ensure the quality and relevance of the produced teaching materials (Asmayanti et al., 2021).

The reason the researcher uses the ADDIE model is that it has well-structured stages that allow developers to easily understand the overall development process. This facilitates monitoring and evaluating the project more effectively. The second reason for using the ADDIE model is that it can be tailored to specific needs and development goals. Developers can choose to focus more on the analysis stage or the evaluation stage, depending on the situation and project needs. The third reason is that the evaluation stage in the ADDIE model helps developers ensure that the training materials or curriculum developed are effective and efficient in achieving the learning process goals. This evaluation also allows developers to improve and update training materials or curricula based on the feedback received. This aligns with the view of Rohma et al. (2022), who state that this model is detailed and systematically organized in efforts to address learning problems related to media that meets the needs and characteristics of student learning. The stages of the ADDIE model include five phases: Analysis, Design, Development, Implementation, and Evaluation.

The Analysis stage includes several activities: (a) conducting a competency analysis required of the students, (b) analyzing student characteristics regarding their learning capacity, knowledge, skills, attitudes they already possess, and other relevant aspects, and (c) analyzing the material in line with the competency requirements. This aligns with the opinion of Fitriyah et al. (2021) that analysis is conducted to identify problems and appropriate solutions and determine student competencies.

The Design stage is carried out through a framework that includes: (a) Who is the learning process designed for? (students); (b) What abilities are expected to be achieved? (competencies); (c) How is the level of mastery of the learning process determined? (assessment and evaluation). According to Septi et al. (2022), the design aims to verify that the product design and developed media align with the competency requirements that students must master. The process of designing learning video media requires two preliminary tasks: creating a flowchart and a storyboard.

The Development stage involves translating the design specifications into a physical form, resulting in a product that reflects the development activity. The development of the learning video media based on Robert Gagne's theory (Nine Events of Instruction) is aligned with the previously created flowchart and storyboard. This media is also supported by learning modules and usage guidelines. This development plan will later be consulted with experts (in content, media, and language) as well as subject teachers (Fudholi et al., 2021).

The fourth stage is Implementation, which refers to the use of the learning video media based on Robert Gagne's theory (Nine Events of Instruction). According to Hadi & Agustina (2016), implementation involves using the developed product in classroom learning activities. The results of the development are used in the learning process to assess their impact on the quality of Informatics learning for seventh-grade students. The created product undergoes real field testing to obtain insights into the level of effectiveness, engagement, and efficiency of the learning process.

The final stage involves conducting evaluation, which includes formative and summative assessments. Formative assessment is used to gather data at each stage for modifications, while summative evaluation is utilized at the end of the program to determine its impact on student learning outcomes and the overall quality of the learning process. The evaluation stage involves assessing the data collected during the implementation phase. The evaluation activities in this research and development project are conducted to prevent errors or inaccuracies in the final product (Anggraini & Putra, 2021).

Results and Discussion

The result of this research and development is a learning video media based on Robert Gagne's theory (Nine Events of Instruction) on the topic of Computer Systems. Based on the procedural stages of development using the ADDIE model, the following data was obtained:

Analysis Stage

The analysis in this study was conducted through observations and interviews with teachers and seventh-grade students at SMPN 1 Siak Hulu, including curriculum analysis, student analysis, and learning environment analysis. The same approach was used by Hadi & Agustina (2016). At this stage, the researcher defines what will be learned and assesses the availability and relevance of the textbooks used in the learning activities.

Based on the analysis of students, the researcher found that Informatics learning at SMPN 1 Siak Hulu uses the Merdeka curriculum, with the learning outcomes for the Computer Systems material as follows: 1) students are able to explain the parts of a computer system, 2) students are able to explain how internal and external components of a computer work together to form a system, 3) students are able to explain how data is encoded.

After analyzing the curriculum, the researcher conducted a student analysis. Through this analysis, the researcher identified several student characteristics, including: 1) students enjoy fun learning experiences, such as using videos and images, 2) students prefer material presented in simple language, 3) students have visual and auditory learning styles, and 4) some students exhibit individual learning styles. Additionally, in the learning environment analysis, it was found that the media used were only the available resources at the school.

After the analysis was conducted, the researcher designed learning video media based on Robert Gagne's theory (Nine Events of Instruction) at SMPN 1 Siak Hulu to assist teachers in teaching and to enhance student motivation and enthusiasm for learning. Learning videos have many advantages; they are suitable media for types of learning such as small group classes or even individual students (Rofiq, 2022). Video is an unprinted teaching medium that is comprehensive and rich in content because it is explained directly to the students.

This aligns with the opinion of Asmayanti et al. (2021) that the analysis step aims to obtain the necessary information regarding the profiles of potential users of teaching materials and to explore the competencies that students will achieve after learning using video media.

Design Stage

The design stage involves carefully planning the product, ensuring that the design aligns with the results of the analysis that has been conducted. At this stage, the researcher creates a plan related to how the learning media will be developed so that it is effective and efficient, and easy for students to use and understand (Asmayanti et al., 2021).

The researcher designs the initial layout of the learning video media by organizing the material based on the Learning Objective Flow (ATP). Next, the researcher selects the media and format, and begins to design the Informatics learning video by preparing the video script and creating a storyboard. Once the script and storyboard are complete, video recording is conducted according to the material and learning activities. The next step involves designing the video cover, followed by editing the video using the CapCut application.

The learning using video media based on Robert Gagne's theory (Nine Events of Instruction) is designed to be as engaging as possible and to facilitate the teacher in the learning process. The learning videos are crafted in accordance with Gagne's learning principles (Warsita, 2008): 1) generating interest and focusing students' attention; 2) conveying learning objectives; 3) recalling previously learned concepts/principles that are prerequisites; 4) delivering the learning material; 5) providing guidance or instructions for learning; 6) obtaining student performance responses; 7) providing feedback on the accuracy of task completion; 8) measuring or evaluating learning outcomes; 9) reinforcing retention and transfer of learning.

Development Stage

The development stage in this research includes activities related to the realization of the product design, specifically the learning video media. According to Cahyadi (2019), there are two important objectives to be achieved in the development stage: 1) to produce or revise teaching media that will be used to achieve the defined learning objectives, and 2) to select the best media to achieve the learning goals.

At this stage, the design of the learning video as outlined in the storyboard is produced into a learning video. The completed learning video is validated by media, language, and content experts. Video recording is conducted according to the material and learning activities, and after the video recording, it proceeds to the video editing stage using the CapCut application.

Figure 2. Initial Display

Figure 3. Opening

Figure 4. Emphasis on learning objectives

Figure 5. Material explanation

Figure 6. Conclusion

After the researcher has finished developing the media, the next stage is the media validation test. According to Latip (2022), the purpose of validation in this research is to measure how effective the learning video that has been created is. Validation is conducted to gather opinions from experts and teachers to assess whether the video is suitable for use in the teaching and learning process. The assessment includes the overall quality of the video as well as the content or material presented.

The media validation test is carried out to obtain feedback and suggestions from validators, with the aim of determining the quality of the product and the feasibility of the media for use and implementation in schools. The validation process is conducted by three validators, consisting of one content validator, one language validator, and one media validator. The results of the media validation of the learning video, as assessed by the validators on the developed product, are as follows:

Figure 7. Writing before revision

Figure 8. Writing after revision

Figure 9. Lack of supporting images before revision

Figure 10. Added supporting images after revision

Figure 11. The use of a less attractive background

Figure 12. Background after revision

After making improvements to the media based on feedback from the content, language, and media validators, the learning video media underwent a second validation. This second validation is very important, as it aligns with the findings from Khusnah et al. (2020), which state that a product should be generated based on observations and a series of trials, followed by revisions to ultimately produce a quality product.

The assessment results provided by the validators during the second validation are as follows:

Table 1. Validator Assessment Results

Validator	Average score	Percentage score	Criteria
Material Expert	4. 3	86%	Very Valid
Language Expert	4. 25	85%	Very valid
Media Expert	3. 94	79%	Valid

From Table 1, it can be seen that the content validation received an average score of 4.3 with a percentage of 86%, which falls into the very valid category. The average score of 4.25 with a percentage of 85% for language validation also falls into the very valid category, while the media validation received an average score of 3.94 with a percentage of 79%, categorizing it as valid. This is in line with the research results from Dewi & Setyasto (2024), which state that the Canva-based Digital Flipbook is valid, achieving a score of 89% from media experts and 88.06% from content experts. Additionally, research conducted by Carolin et al. (2020) also indicates that the learning video media received good scores from experts: 94% from subject experts, 90% from media experts, and 94% from instructional design experts, all qualifying as very good.

The learning video must contain material that aligns with the expected learning outcomes. According to Yumanita (2016), the explanations provided should be understandable to students, encompassing facts, concepts, principles, or generalizations related to the assessment of the learning video media according to the learning objectives.

The language used in the learning video is clear and does not lead to multiple interpretations. According to Wicaksono (2016), language, as a tool for conveying messages related to learning, has several characteristics: a) language is symbolic, b) meaning resides with the person, not in the words, c) language shapes individual perceptions, d) language reflects individual attitudes.

Learning video media should possess an appeal that can stimulate curiosity from the target audience. A learning video should ideally present an opening that provides a stimulus for students, encouraging them to develop a deeper interest in the upcoming learning activities. This aligns with the findings of Nurwahidah et al. (2021), which suggest that through the presentation of learning videos, students feel as though they are present or participating in the depicted atmosphere. With the presence of video media, students can achieve abilities in cognitive, affective, and psychomotor domains, as well as enhance their interpersonal skills.

Implementation Stage

According to Cahyadi (2019), the main goals of the implementation activities are: 1) to guide students in achieving learning objectives, 2) to ensure that problem-solving occurs to address issues previously faced by students in the learning process, and 3) to ensure that students' abilities improve by the end of the learning process.

After the learning video media has undergone validation, a practicality test was conducted by teachers and students, implemented with 30 seventh-grade students at SMPN 1 Siak Hulu. After implementing the

learning video based on Robert Gagne's theory (Nine Events of Instruction), students filled out a questionnaire to assess their responses. The results of the practicality test conducted by teachers and students are as follows:

Table 2. Results of the Practicality Test for Learning Video Media

Respondent	Average score	Percentage score	Qualification
Informatics Subject Teacher	4.62	92%	Very practical
Students	4.50	90%	Very practical

Based on the table above, the results of the practicality test conducted by the teacher were 4.62 with a percentage score of 92%, categorizing it as very practical. Furthermore, the practicality test by students yielded an average score of 4.50 with a 90% practicality rating. The results of the practicality trial indicate that the developed learning video media is deemed very practical. This aligns with previous research by Pitriani et al. (2021), which showed that student responses after field trials obtained an average score of 4.46, classified as X > 4.21, indicating it is very suitable for interactive learning media using Lectora Inspire in the Hindu Religious Education study program.

Evaluation Stage

The evaluation stage is the final step conducted to assess the development of the learning media. Evaluation is a process carried out to provide value to the development of learning media. The goal of this evaluation is to determine whether the developed learning media can be used in the teaching process and to gauge students' interest in using the developed learning media (Fudholi et al., 2021).

The evaluation of the developed learning media aims to ascertain several aspects, namely: 1) students' attitudes towards the overall learning activities, 2) improvement in students' abilities as a result of participation in learning activities, and 3) benefits perceived by the school due to the increase in students' competencies through the development of learning media (Cahyadi, 2019).

According to Syafril (2019), the effectiveness formula used to test the descriptive hypothesis involves the following steps:

$$d = pretest\ score - posttest\ score$$

Calculating the mean difference:

$$Md = \frac{\Sigma d}{n} \quad (1)$$

Calculating using the t formula:

$$t = \frac{Md}{\sqrt{\frac{\Sigma x^2}{N-(N-1)}}} \quad (2)$$

Where:
Md : Mean of the differences between pre-test and post-test
$\Sigma x^2 d$: Sum of the squared deviations
N : Number of samples

The results of these calculations are then compared with the t-table. The following are the results of the effectiveness test of the learning video media:

Table 3. Results of the Effectiveness Test of Learning Video Media

Respondent	Total Pre-test	Total Post-test	Number d	(x) d = (d - md)	(x^2) d
30 students	1800	2835	1035	0	3867.5
Md					34.5
t					16.5

The effectiveness test results indicate a t-value of 16.5. Next, the t-table was referenced with df = N-1 = 29 at α0.05, yielding a t-table value of 2.045. Thus, since the calculated t-value exceeds the t-table value, it can be concluded that there is a significant difference between the pre-test and post-test scores. This aligns with the research by D. Inayati & Setyasto (2024), where data analysis showed a significant p-value of 0.000. The testing criteria using the paired sample t-test indicate that if the significance value (2-tailed) < 0.05, there is a significant difference between pretest and posttest results, and vice versa. The t-test results show a significance value (2-tailed) of 0.000 < 0.05, indicating a significant difference between pretest and posttest learning outcomes. Additionally, the research by Harahap (2021) reported responses from three students in individual trials regarding the quality of learning materials, which received a "very good" rating with a percentage of 89.92%.

Conclusion

Based on the data analysis outlined in the previous chapter, the following conclusions can be drawn: The research on the development of learning video media based on Robert Gagne's Theory (Nine Events of Instruction) for Informatics subjects in junior high school used the ADDIE model, with the development procedures as follows: (a) Analysis, (b) Design, (c) Development, (d) Implementation, (e) Evaluation. This

research produced video media that can assist teachers in delivering lessons.

The validity test results for the learning video media based on Robert Gagne's Theory (Nine Events of Instruction) for Informatics subjects revealed an average score of 3.3 with a percentage of 86%, categorizing it as "very valid." The validity test by language experts yielded an average score of 4.25 and a percentage score of 85%, qualifying as "Very Valid." The media validation received an average score of 3.94 with a percentage score of 79%, categorized as "Valid." The practicality test by teachers resulted in an average score of 4.55, with a practicality assessment percentage of 91%. The practicality trial indicated that the developed learning video media is "Very Practical."

The practicality test results from students showed a total average score of 4.50 with a percentage of 90%. Therefore, the assessment results fall into the achievement category of 80-100%, with the qualification of "Very Practical," encompassing the media's suitability with student interests, clarity of language and audio, ease of use, and utility of the media.

The effectiveness test yielded a t-value of 16.4. Next, the t-table was referenced with df = N-1 = 29 at α0.05, resulting in a t-table value of 2.045. Thus, since the calculated t-value exceeds the t-table value, it can be concluded that there is a significant difference between the pre-test and post-test scores. In other words, the learning video media based on Robert Gagne's Theory (Nine Events of Instruction) for Informatics subjects in junior high school is "Effective" for use in the learning process.

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