
DESIGNING MATHEMATICS LEARNING VIDEOS: INCORPORATING LOCAL WISDOM TO EXPLORE NUMBER PATTERNS

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ABSTRACT

Teachers often face challenges in creating effective learning materials, particularly in mathematics. Traditional lecture methods and insufficiently engaging learning tools can lead to student disinterest. Hence, it is essential to develop mathematics learning media that stimulate interest and connect to real-world experiences, including local cultural practices. Therefore, this study aimed to design effective learning media for Year 8 students focused on number patterns and to assess the validity of this media. This research adopted a development approach, utilizing the Analysis, Design, and Development (ADDIE) method. The development process was limited to the Analysis, Design, and Development stages. An assessment questionnaire was used to evaluate the validity of the video media, with input from both media experts and material experts. Five experts from each field were consulted for media validation. Results of the validation process indicated that the video media scored 88% and 87% in the material expert and media expert evaluations, respectively. These scores met the criteria for validity, indicating that the media is suitable for use in the classroom.

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INTRODUCTION

Education plays a crucial role in sustaining human life (Rahmayanti et al., 2020 ; Patty & Zakarias, 2021), providing individuals with problem-solving skills applicable to daily life (Aprilia et al., 2022 ; Wahono et al., 2020). Education continues to evolve as we enter the 21st century, with numerous strategies available to enhance its quality (Rahmayanti et al. & 2019). To realize quality education, it is necessary to have effective learning media for the subjects presented (Nurfadhillah, Ramadhanty Wahidah et al., 2021; Hidayati et al., 2019). With the rapid development of science and technology in the era of globalization (Kunsa'aidah, 2021), advancements in learning media are expected to significantly impact the field of education (Nurfadhillah, Ningsih, et al., 2021).

Learning media is the most important part of the learning process (Anasti, 2021; Lusiana & Maryanti, 2020). The use of learning media can help make it easier for teachers to teach and foster enthusiasm and student interest in learning (Indriyani, 2019). Learning media can also be applied to learning mathematics (Shafa & Yunianta, 2022). Mathematics is considered a difficult subject for students (Susanti, 2020).

Mathematics is significant in human life and the advancement of science and technology (Sudihartinih et al., 2021; Rahman et al., 2022). Mastery of mathematical skills goes beyond simple counting (Saputri et al., 2021), requiring logical and critical thinking to solve problems relating to everyday situations through mathematical solutions (Azizah et al., 2020 ; Anwar, 2018). Among the crucial mathematical topics to study are number patterns (Astuti, 2020), which have direct relevance to real-world scenarios and frequently appear in academic exams (Julianti & Nasution, 2021). However, many students struggle with number pattern materials (Astuti, 2020), encountering difficulties in compiling data, identifying patterns among specific sets, and recognizing patterns in flat shapes, such as triangular and rectangular number patterns.

Teaching materials are the most important factor in creating an effective learning process for students at school (Suprihatin & Manik, 2020). Learning mathematics using the lecture method and makeshift media makes students less interested in learning (Jamila et al., 2021). This allows students to not pay attention to material explanations or just focus on chatting with friends (Magdalena et al., 2020). Based on these problems, teachers are

expected to be able to take advantage of current technological developments to create interesting teaching materials (Parlindungan et al., 2020).

One of the teaching materials that can be applied in mathematics lessons is learning videos that can attract students' attention and help students learn independently (Ardhianti, 2022) (Magdalena et al., 2021) (Suryadi & Mushlih, 2019). In addition, so that students understand more about the material, this number pattern can be related to everyday life, including local wisdom. Local wisdom of an area can be included in education as an effort to preserve the local culture of an area (Wardhani, 2022). This aims to create an interesting and fun learning atmosphere so that students do not get bored and can fully understand the material presented (Aisara et al., 2020 ; Yusria, 2021). Thus, students can understand the material pattern numbers well.

Incorporating the local wisdom of a region into a learning video is an effective way to engage students in learning the presented material. One way to make teaching materials in the form of learning video media is by using the Animaker web tool. Animaker is an online animation software that provides various types of backgrounds and characters (Ningtyas et al., 2021), with numerous templates available to design visually appealing and creative media. (Sari et al., 2022). Figure 1 displays an overview of the Animaker web tool.

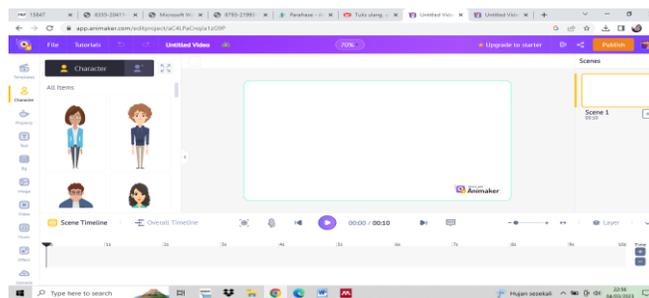


Figure 1. The Animaker Web Tool

This research was conducted to help a teacher prepare interesting teaching materials by providing steps to design learning video media. The creation of mathematical learning video media is done using animaker, so in this video combines animation with local wisdom of the local area. This is something new in the learning video for mathematics.

METHOD

The research design for developing mathematics learning video utilized the Research and Development (R&D) method, which aims to produce a product (Defi & Faiza, 2021;

Asmal; Masruhim, Muhammad Amir; Suryaningsi, 2022). The media design in this study employed the ADDIE development model consisting of analysis, design, development, implementation, and evaluation stages (Dwitiyanti et al., 2020). The ADDIE model was chosen because it provides a systematic approach to developing a learning medium and ensures the resulting product's validity. The stages involved in developing local wisdom-based learning video media using the ADDIE research model are illustrated in Figure 2.

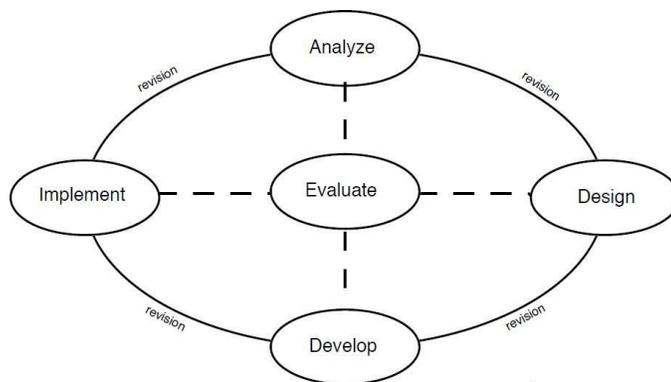


Figure 2. Sources of the ADDIE model: (Hidayati et al., 2019)

However, research will be limited to the stage of media development aimed at producing a product that will then be validated. In terms of phases in the design of a learning video for mathematics:

The first stage is the analysis stage, which is to identify a problem that is likely to occur in the learning process. To analyze the initial needs in developing such learning media, then necessary problem analysis, need analysis, content analysis, and analysis of hardware and software needs (Anwari et al., 2020).

The second stage is designing, which starts by creating what is needed based on the problems obtained at the analysis stage, setting implementation or development goals, and developing testing strategies (Hananta & Sukardi, 2018). In completing this stage, the teacher is expected to be able to prepare a set of special functions to fill gaps in the implementation of learning.

The third stage is designing and developing a product based on known problems. The development stage aims to produce and validate the teaching materials made (Liberta Loviana Carolin et al., 2020). If the design has already been produced through validation and modification, the next step is to evaluate the media-making process. Based on this stage, it is expected to produce a learning video for Year 8 number patterns. The learning media

produced in the form of video is this because the video is considered to facilitate the teacher in explaining the material that can be accompanied by the image as an example of clarification. In addition, a learning video can help students to understand the context of subjects both at school and outside of school.

In this study, there are instruments in the form of a validation questionnaire of material experts and media experts to know the validity of the media. There are 22 indicators with five aspects, including conceptual suitability, systematics and clarity of concepts, implementation, evaluation, and learning strategies. There are 20 indicators with five aspects: language, visual media, audio media, typography, and benefits. The mathematical material used in this research medium is a strange class number pattern material.

RESULT AND DISCUSSION

The present study aimed to develop a visual-audio mathematical learning medium for Year 8 number patterns that is associated with local wisdom, using the Animaker web tool. The resulting learning media design is considered valid and can be used in the learning, as confirmed by the results of the media validity tests. Therefore, teachers can use the step-by-step approach presented in this study to create a similar learning video for other math topics. The design process of the local wisdom-based learning video for Year 8 pattern materials involved the following stages.

The Analysis Stage

This stage begins by analyzing a problem in learning mathematics (Hidayat & Nizar, 2021). The analysis results show that there are problems in learning mathematics. Students often consider mathematics difficult (Anditiasari, 2020) (Suhendri et al., 2022). One of the materials considered difficult is the number pattern material, in which students have difficulty in assembling data, determining patterns on the quarter-n, and defining the pattern in the form of flat builds such as triangle number and square length patterns. This leads to a lack of student interest in following the process of learning mathematics. Other problems are also due to the method used still using the method of lectures. Besides, teachers only use the student worksheet or textbooks available at school so that the students become bored. This occurs in number patterns learning, causing students to have difficulty and disturb the material. Therefore, a learning medium is needed as a teaching material that can make students enthusiastic about learning and improve student understanding of the material of

numbers patterns. One of the methods of learning mathematics that can be used is a learning video (Diah Purnami Dewi et al., 2022), which is associated with interesting things (Lukman et al., 2019).

The Design Stage

In this stage, the researchers delineate ideas for creating and developing the media that will be made as a solution to the problems found, such as compiling teaching materials, designing products, and preparing evaluation tools. The media to be developed is a mathematics learning video media with class VIII pattern material. Next, product design activities are tailored to the core and basic competences, and learning objective. In addition, the researchers also collected images that would be incorporated into the learning video, selected local intelligence that could be attributed to the material, recorded duplicates, and created animations. The researchers then created an assessment tool that would be used to measure the quality of mathematical learning media with media validation performed by material experts and media experts.

The Development Stage

This stage begins to produce video media from the already designed design. Next is creating and developing a learning video media associated with local wisdom to the number pattern material using the Animaker web. Creating a learning video through this Animaker web can be solved with the following steps:

The first step to access the Animaker website is to enter Google Chrome and do a search for Animaker, then click on the website at the very top. Then click on the sign-up section and log in using your account. If you have registered, click on the dashboard to select an interesting video form. Next, choose a video background with a click "**Bg**" and then choose the background that we want or that matches the theme of the learning video. However, if you are going to use a background or want to add another image that is not in the selection, then select upload then, click the background or image to add, then click Ok, after uploading please click the image. It will automatically become the background that will appear in the video.

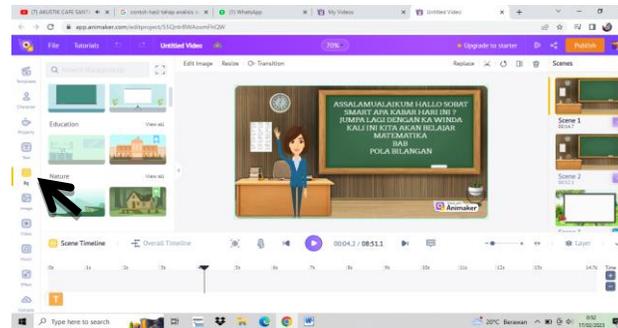


Figure 3. The background animator

Next, to select an animation on the Animaker web, you can click on Character, then choose an animation that matches the theme of the learning video. Next, to make this animation move, we can click the action and choose the movement that will be carried out in the animation.

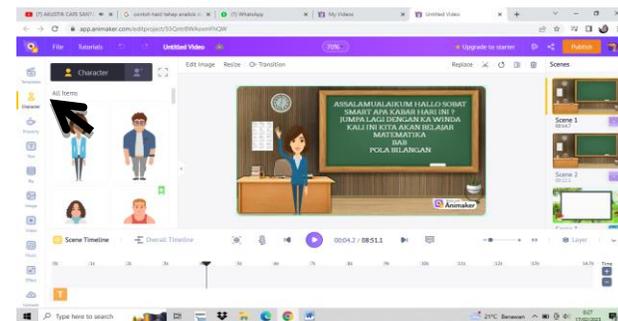


Figure 4. Features of Animaker

Writing text can be done by clicking “**Text**,” then selecting the type of writing listed next to it, then clicking the appropriate one then writing the text that will be inserted into the video media. To make the text in the video move, click on the animation, then select what you want. Meanwhile, to add slides to the video, you can click the plus sign or Add Scene at the bottom right.

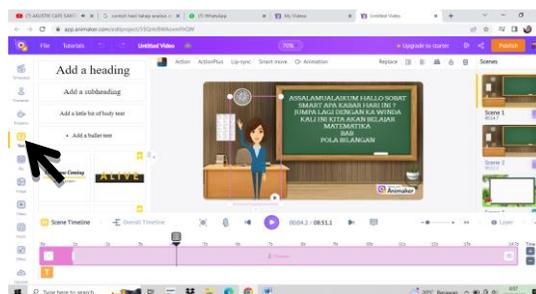


Figure 5. Text by Animaker

Furthermore, you can click on the overall timeline section to add sound or record sound, which can edit, cut, add sound, and so on. To add other existing recordings, you can upload them into Animaker by clicking upload, then selecting the recordings to be used after being uploaded, clicking on the recordings, and adjusting the duration in the video slides that have been made.

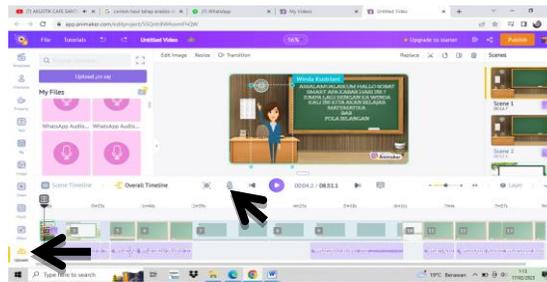


Figure 6. Sound recording in Animaker

After the video design is complete and has been corrected, click publish on the top right, select download video, select the video quality, and click download to save the video results. Next, wait until the video is uploaded then click download and the video will be saved.

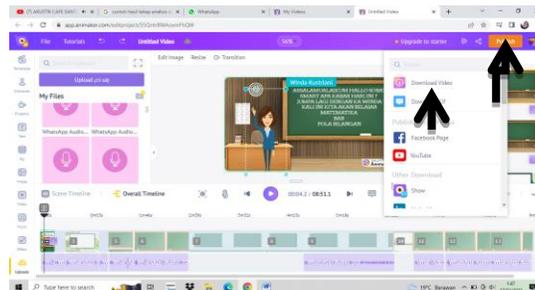


Figure 7. Save the Animaker video

After the video media has been designed, a validation test is then carried out to determine the validity of the learning video media. The video media validity test will be carried out by material experts and media experts each carried out by 5 people. The results of the validation of the learning video media are presented in Table 2.

Table 2. Validation of material experts

Aspect of	The Validator Score				
	I	II	III	IV	V
Concept compatibility	3.00	3.33	4.00	3.67	3.67
Systematics and clarity of concepts	3.40	3.20	3.80	4.00	4.00
Execution	3.29	3.00	3.71	3.71	3.71
Evaluation	3.33	3.33	3.33	4.00	3.67
Strategy	3.25	3.00	3.50	3.75	3.75
Final value	3.25	3.17	3.67	3.83	3.76
Average			3.54		
Criteria			Very valid		

Table 3. Validation of media experts

Aspect of	The Validator Score				
	I	II	III	IV	V
The language	3.33	3.00	3.67	4.00	4.00
Audio Media	3.25	3.50	2.75	3.75	4.00
Visual Media	3.20	3.40	3.00	3.80	3.80
Typography	3.00	3.25	2.75	3.75	4.00
Usefulness	3.00	3.50	3.25	3.75	4.00
Final value	3.16	3.33	3.08	3.81	3.96
Average	3.47				
Criteria	Highly valid				

Table 1 shows the results of the validation of material experts and media experts assessed by five validators based on several aspects. In the validation of the expert material, there are aspects of conceptual suitability, the systematic aspects and the clarity of concepts, the implementation aspects, the evaluation, and the learning strategy aspects. Based on the results of the assessment of each validator reviewed from several aspects, the material validation test obtained a final score with an average of 3.54 with a presentation of 88%. Hence, the material validation test results were in the interval of $88\% < P \leq 100\%$ (valid and eligible criteria).

The media expert validation test was also evaluated by five validators. They reviewed several aspects of the media validation sheet, including language, visual media, audio, typography, and functional and usefulness aspects. The media validation test results showed a final score of 3.47 with a presentation of 87%, which is in the interval of $87\% < P \leq 100\%$ (valid and eligible criteria).

The validation test results of the learning video for the Year 8 number patterns indicates that it is valid and suitable for use in enhancing students' learning motivation and promoting independent learning at school and home. The Animaker web-based mathematics learning media integrates local wisdom, which is designed to address the issue of the challenge faced by educators in creating learning materials that align with the curriculum. The need for effective instructional design in creating a stimulating and engaging learning environment for students is crucial. The use of local wisdom in math-based learning videos promotes a meaningful and contextualized learning experience that is highly motivating for mathematics students (Wardhani, 2022). Various forms of learning media have been developed to improve mathematics learning, including a video created using Microsoft Office PowerPoint application (Kunsa'aidah, 2021) and games developed using the Scratch application (Sudihartinih et al., 2021). It is widely acknowledged that the use of learning

media can have a positive impact on the learning outcomes of students, making the learning process more engaging and effective (Suryadi & Mushlih, 2019). Therefore, it is important for educators to explore and utilize various types of learning media to enhance the quality of mathematics education.

CONCLUSION

The present study aimed to design a learning video for Year 8 mathematical patterns using the Animaker web tool. The development of the learning video followed the ADDIE model stages, which were limited to the analysis, design, and development stages. The video was designed to incorporate local wisdom, making it more appealing to students. The resulting video is expected to aid teachers in their teaching tasks in schools. The material and media validation tests showed a validity index of 88% and 87%, respectively, meeting the criteria for validity and usefulness. Hence, teachers can utilize the steps in creating a learning video using the Animaker web tool for teaching materials.

There are opportunities for future research in designing a learning video using web animakers, as described in this study. Researchers could explore this approach and adapt it to different subject areas and learning levels. In addition, there is a need for further testing and evaluation of the effectiveness of such media in supporting students' learning outcomes. Specifically, future studies could focus on assessing the effectiveness of the developed mathematical learning media on Year 8 number patterns.

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