Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

Development of H5P-Based Animated Learning Videos to Stimulate Computational Thinking Skills of Junior High School Students

Aysetu Sindana Mahia Kaputri, Kartini Herlina*, Daniel Rinaldi
Information Technology Education, University of Lampung
Corresponding Author e-mail*: kartini.herlina@fkip.unila.ac.id

\

Abstract: The 21st century is marked by technological advancements that are transforming education into more flexible and project-based, with computing thought as a key skill. However, many students still have difficulty understanding computational concepts, such as algorithms, due to less attractive teaching methods. Therefore, learning media innovations, such as H5P-based animated learning videos, are urgently needed. This research uses the Research and Development (R&D) method with *a pre-experimental one-group pre-test post-test design* in two schools, namely State Junior High School 1 Metro and Muhammadiyah Junior High School 1 Metro. The results of the video development showed a media validity score of 3.91 and material 3.88, both in the very valid category. The effectiveness test showed an average N-Gain of 0.62 (62%), which is classified as moderate in improving computational thinking skills. This animated learning video is suitable for use in the learning process.

Article History
Received: 12-06-2025
Revised: 12-10-2025
Published:.. 20-10-2025

Keywords:
animation learning videos, H5P, Computational thinking, R&D.

How to Cite: Kaputri, A. S. M., Herlina, K., & Rinaldi, D. (2025). Development of H5P-Based Animated Learning Videos to Stimulate Computational Thinking Skills of Junior High School Students. *Jurnal Teknologi Pendidikan : Jurnal Penelitian Dan Pengembangan Pembelajaran*, *10*(4), 623–638. https://doi.org/10.33394/jtp.v10i4.16326

https://doi.org/10.33394/jtp.v10i4.16326

Introduction

The 21st century is characterized by technological advances and rapid information distribution, which is changing the educational paradigm from a teacher-focused system and curriculum to a more flexible and project-based one. According to the OECD (*Organization for Economic Co-operation and Development*), it is important to align educational objectives with national curricula and assessments so that relevant skills can develop (Bray et al., 2023). One of the key skills in this context is computational thinking, which involves systematically deciphering problems and decision-making skills (Lestari & Annizar, 2020).

Computational thinking skills are increasingly relevant in the information age, where problem solving requires analytical skills and an understanding of algorithms. (Wing, 2015) emphasizes that this skill is important for everyone, not just scientists, so it needs to be introduced to students. Programming algorithms, as part of computer science, are also considered effective for building computational thinking skills (Bocconi et al., 2016).

However, although computational thinking skills are one of the important learning outcomes for students, in reality there are still many students who have difficulty in understanding computing concepts such as basic programming and algorithms. This can be due to less engaging teaching methods and limited time to understand the material in depth. Therefore, innovation is urgently needed in the development of learning media, such as digital media, which is indispensable to improve students' understanding (Gulo et al., 2021).

One type of audio-visual-based media that has the opportunity to help students understand computing concepts is animated learning videos. This media can not only attract the attention of students, but also improve the learning process by presenting information audio-visually (Lukman et al., 2019). Learning videos are able to expand access to quality educational resources and help students' cognitive and psychomotor development (Ghaljaei et al., 2022).

One of the videos that will be designed is an H5P-based animation learning video. H5P stands for *HTML5 Package H5P*, *an open-source platform* for creating interactive content, offering features that allow the creation of animated learning videos. With excellence in visual and interactive presentation, this video can help students understand abstract concepts and assist teachers in imparting computational thinking skills to students (Schez-Sobrino et al., 2024).

Based on interviews at junior high school 1 Metro, Muhammadiyah JHS 1 Metro, and Ma'arif JHS 5 Metro, various problems were found. At junior high school 1 Metro, laboratory facilities are adequate, but learning is still conventional and the use of technology is not optimal, even though video media has been used.Muhammadiyah JHS 1 Metro and Ma'arif JHS 5 Metro, learning is also still conventional plus there are limitations in computer laboratories.

In observations made to students, 63.4% of students liked algorithm material, but 48.8% still had difficulty understanding it because of conventional learning methods, making it one of the obstacles for students in understanding the concept of computational. While prior research has explored digital animation and e-learning tools in education, few studies have specifically focused on the development of interactive H5P-based learning videos designed to stimulate computational thinking among students. Therefore, H5P-based Animation Learning Videos were developed to stimulate students' computational thinking skills in Algorithm materials at the junior high school level. The purpose of this research is to develop and assess the feasibility of H5P-based animated learning videos that can effectively stimulate students' computational thinking skills. Theoretically, the results of this study are expected to contribute to the development of digital's video learning models based on interactivity, which can serve as a reference for future technology integrated learning innovations

Research Methods

This research uses *the Research and Development* (R&D) method, which is a research method that aims to develop and validate certain products, the resulting products are in the form of H5P-based animated learning videos. The R&D research steps consist of three main stages: 1) the preliminary study stage which includes literature study, field studies, and the preparation of an initial draft of the product. 2) The development stage involves limited trials and large-scale trials. 3) the testing stage which includes *pre-test*, treatment, and *post-test*. In carrying out the development process, this research refers to the Alessi and Trollip development model, which includes essential stages in producing multimedia-based learning media. The process begins with 1) The planning phase that focuses on identifying learning objectives, analyzing learner characteristics, and determining the scope of the content. 2) The design phase, where the structure of the learning media is arranged, including the preparation of scripts, storyboards, interface layout, and selection of appropriate instructional strategies. 3) The development phase, where all multimedia components such as animation, graphics, audio, and interactivity are produced and integrated into a cohesive learning product. Throughout the entire process, evaluation is continuously carried out to ensure the quality and effectiveness of the product, both through formative reviews during development and summative assessments after implementation.

The research design used is a pre-experimental design with a one-group pre-test post-test approach. In this study, the sample group consisted of two classes of eighth-grade students, namely one class from SMP Negeri 1 Metro with 33 students and another class from SMP Muhammadiyah 1 Metro with 30 students, for a total of 63 students. These two classes served as experimental groups. The treatment given was the application of H5P-based animation learning videos in guided inquiry learning, with the students' initial abilities measured first through a pre-test. After the treatment was applied, their learning outcomes were measured again through a post-test. This study did not involve a control class and specifically aimed to determine the effect of applying H5P-based animation learning videos in guided inquiry learning on stimulating students' computational thinking skills.

Prior to data collection, ethical approval and research permission were formally obtained from the participating schools to ensure compliance with institutional and educational research standards. All student data were treated with strict confidentiality, anonymized during analysis, and used exclusively for academic and research purposes in accordance with ethical research principles.

The data analysis techniques that have been carried out include product validity, practicality, and effectiveness

1) Product Validity

Validity testing is used to assess the extent to which a tool can measure the variables intended for the research objectives. To measure the validity of a product, media validity testing is required, whereby the product testing process will involve two media experts, namely lecturers from the Multimedia Department of the University of Lampung, and two subject matter experts, namely informatic teachers from Junior high school Muhammadiyah 1 Metro, and Junior high school state 1 Metro. The data analysis was carried out using Microsoft Excel 2013 to process and calculate the results. The criteria for validity can be seen in the following formula.

$$Assesment\ score = \frac{\text{Average Score}}{\text{Maximum Score}} x100\%$$

Source: (Pangestu, 2021)

After obtaining the score, the score definition adapted from Ratumanan & Laurent (2011) will be carried out. The table for defining validity scores can be seen in Table 1.

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

Table 1. Definition of validity score

Score Interval Assessment Results	Criterion
3.25< score <4.00	Highly Valid
2.50< score <3.25	Valid
1.75< score <2.50	Quite Valid
1.00< score <1.75	Less Valid

Based on the assessment score criteria table, the researcher gives a standard that the product can be said to be valid if it reaches a predetermined value, namely in the minimum score range of 2.51 to 3.25.

2) Reliability Test

Reliability testing is a test conducted to show the extent to which the instruments used can be trusted in a study. This reliability testing uses the Cronbach's Alpha formula with the help of SPSS 20.0 software.

The criteria for defining the reliability score of the instrument can be seen in Table 2.

Table 2. Reliability score's definition

Value	Information
$0.80 < r_{11} \leq 1.00$	Very high reliability
$0.60 < r_{11} \leq 0,80$	High Reliability
$0.40 < r_{11} \leq 0,60$	Medium Reliability
$0.20 < r_{11} \leq 0.40$	Low Reliability
$0, < r_{11} \leq 0.20$	Very Low Reliability

Source (Arikunto, 2013)

3) Product Practicality

Product practicality testing is an evaluation process that aims to assess the ease of use, effectiveness, and comfort of a product in a real-world context (the material can be understood). Practicality testing is conducted with a small group involving 10 students and 2 informatic teachers.

The results obtained from the calculation of the equation below are used to determine the practical value of the learning video. The data analysis was carried out using Microsoft Excel 2013 to process and calculate the results. The table below presents the definition of the response value adapted from Arikunto (2011). The criteria for practicality can be seen in the following formula.

$$Assesment\ Score = \frac{\text{The number of scores obtained.}}{\text{N} - \text{maximum scores}} x100\%$$

Source : (Arikunto, 2011)

Table 3. Product Practicality Criteria

Yes	Percentage (%)	Category
1	>80% - 100%	Very practical
2	>65% - 80%	Practical
3	>40% - 65%	Quite practical

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

4	>20% - 40%	Less practical
5	0% - 20%	Impractical

The research product is declared practical if it reaches a minimum percentage value of >65% to 80%.

4) Product Effectiveness

To measure the effectiveness of a product on students, an N-Gain test is carried out. N-Gain is calculated based on a comparison between the students' post-test and pre-test scores. The data analysis was performed using SPSS version 20.00 to process and interpret the N-Gain results. The following is the N-Gain formula used, which is adapted from Hake (1998).

$$N_{Gain} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Max scores} - \text{Pretest scores}}$$

Source : (Hake, 1998)

Table 4. N-Gain testing criteria

N-Gain Criteria	Score
High-g	$(g) \geq 0.7$
Medium-g	$0.3 \leq (g) \leq 0.7$
Low-g	$(g) < 0.3$

Source : (Hake, 1998)

Based on the criteria of the N-Gain test table, the effectiveness of a product can be considered good if the N-Gain score exceeds the interval of 0.31-0.69 which falls into the moderate or good category.

Results and Discussion

In this study, the planning stage begins with observation and interviews with teachers who teach informatics subjects on algorithm materials at Junior High School 1 Metro & Muhammadiyah Junior High School 1 Metro.

Table 5. Results of interviews with informatics teachers.

Question	Answer
What is the learning process during class, what learning method is used?	Current learning still tends to use the lecture method.
What learning media have been used in the learning process?	The learning media used is still in the form of text in the form of books, power points, and boards.
At the time of learning, which subchapter part is the most difficult to teach to students?	Subchapters that are considered difficult in algorithm material are the flowchart symbols section, students have difficulty in recognizing and understanding each function of the symbol.
In the learning process, algorithms have students been trained to formulate problems, and group discussions to get the best solutions?	Not yet at that stage

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

At the design stage, it starts with making *flowcharts*, designing *storyboards*, designing scripts, and arranging instruments. These stages are arranged systematically.

a) Flowchart

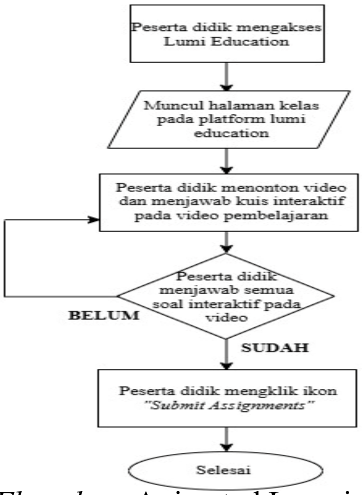
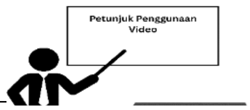
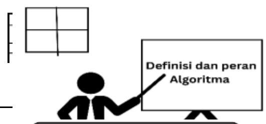
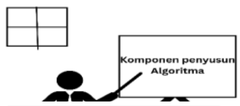
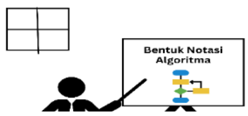


Figure 1. *Flowchart* Animated Learning Video Users H5P based

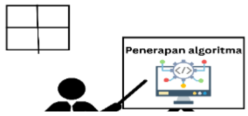
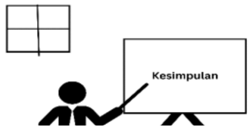
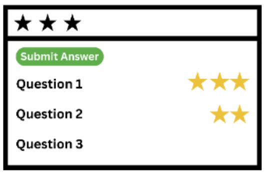
b) Storyboard

Table 6. *H5P based animated learning video* storyboard

No	*Scene*	Figure
1	Clip1 "Video Usage Instructions"	
2	Clip2 "Definition and role of Algorithms"	
3	Clip3 "Interactive Quiz Appears 1"	
4	Clip4 "Algorithmic Components"	
5	Clip5 "Interactive quiz 2 appears"	
6	Clip6 "Algorithm Notation"	
7	Clip7 "Interactive quiz 3 appears"	

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

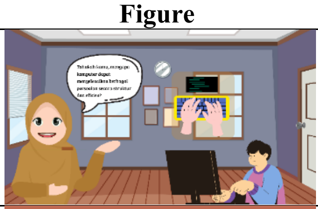
No	*Scene*	Figure
8	Clip8 "Implementation of Algorithms in Daily Life"	
9	Clip9 "Interactive quiz 4 appears"	
10	Clip10 "Conclusion"	
11	Clip 11 "*Submit Answer*"	

The development stage is the final step in the development model proposed by Alessi and Trollip. The development stages are presented in the following table.

1. Media Production

1. Algorithm Basics

Table 7. Algorithm Definition Material

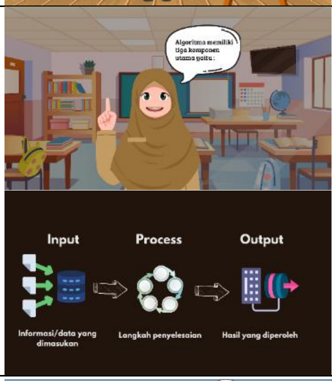
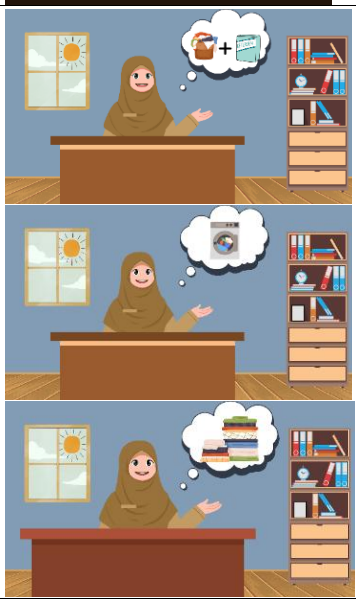
No	Figure	Descriptions
1		Providing stimulus at the beginning of learning about the algorithm works.
2		The initial question is what is meant by algorithm.
3		Explanation of the algorithm.
4		Example of an algorithm depiction

2. Components of the Algorithm
3.

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

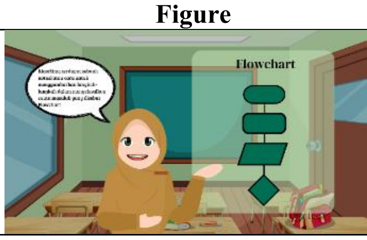
Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

Table 8. Components of the Algorithm

No	Figure	Descriptions
1		Questions about what are the components that make up the Algorithm
2		Explanation and illustration of the constituent components in an algorithmic system
3		Examples of the application *of Input*, Process, and *Output* algorithms in daily life.

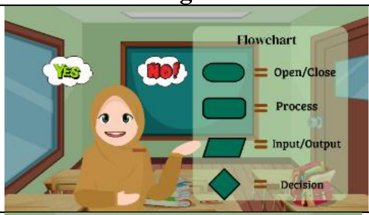
4. Notation in Algorithms

Table 9. Algorithm Notation

No	Figure	Descriptions
1		Explanation of the meaning of *flowchart.*

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

No	Figure	Descriptions
2		An explanation of *flowchart symbols.*
3		Implementation of *flowcharts* on algorithms.

5. Reliability Test's Result

After designing the animated learning video display, the researcher then developed ten evaluation questions to test computational thinking skills and test the validity of the questions. The instrument test was carried out on 33 respondents (N=33) from VIII's class JHS State 1 Metro The results of the reliability test of the computational thinking test instrument are presented in Table 10.

Table 10. Reliability Test's Result

Reliability Statistics	
Cronbach's Alpha	*N of Items*
0,829	10

Based on the results of the reliability statistics shown in Table 17, *Cronbach's alpha* value for the test is 0.829. This shows that the visual literacy test instrument developed has a very high level of reliability and is suitable for use for the next stage of research.

2. Product Validity Test

a) Media Expert Validation

The validity assessment criteria include several aspects, including aspects of display quality, audio quality, and benefits. For the assessment aspect as presented in Figure 2.

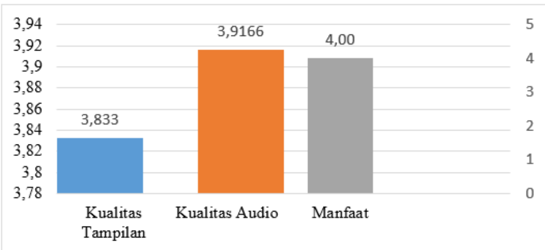


Figure 2. Media expert validation results

Based on figure 2, there are three aspects of the assessment from media experts that show that each aspect gets a score above 3.25. The first aspect is the quality of the display, which consists of 9 questions and obtains a score of 3.83, so it is categorized as very valid. It emphasizes that the visual quality in H5P-based animation learning videos is very important, especially in describing the visualization of algorithm material.

The second aspect is audio quality, which consists of 6 questions and gets a score of 3,91, also in the very valid category. This highlights that the quality of the sound used in the media is very good and is able to support the learning process well.

The last aspect is the benefit, which consists of 5 questions and obtains a score of 4.00, which belongs to the very very very valid category. This emphasizes that quality learning media, both visually and audio, has great potential to increase students' understanding of the material being taught.

b) Validity of Subject Matter Experts

The validity of the subject matter expert is carried out to see the suitability of the content in the animated learning video to the curriculum outcomes and objectives. The assessment of the validity of the subject matter expert can be seen in Figure 3.

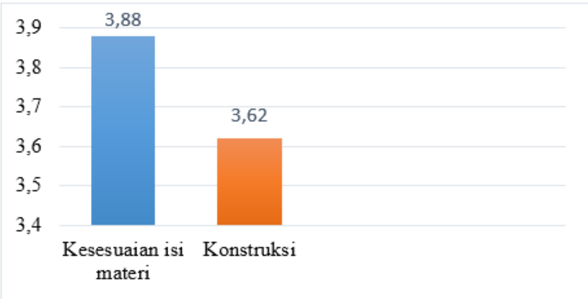


Figure 3. Subject Matter expert validation results

Based on figure 3, there are two aspects of the assessment from the material expert which shows that each aspect gets a score above 3.00. In the aspect of the suitability of the content of the material, which consisted of 9 questions, a score of 3.88 was obtained, which was categorized as very valid. Meanwhile, in the Construction aspect, which consisted of 8 questions, a score of 3.62 was obtained also in the very valid category. The overall score of the subject matter expert aspect is 3.75. This shows that H5P-based animated learning videos not only have relevant material, but are also constructively designed.

Based on the description of the test results, it can be understood that the test results show very high validity of H5P-based animation learning videos, which in this case supports the theory of Nieveen (1999). Where validity in product development according to Nieveen includes the validity of content (content), and the validity of constructs.

3. Product Practicality Test

a) Teacher Perception Assessment

Teacher perception refers to the way teachers view, understand, and interpret H5P-based animated learning videos that have been developed. The results of the teacher's perception assessment as presented in Figure 4.

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index
Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

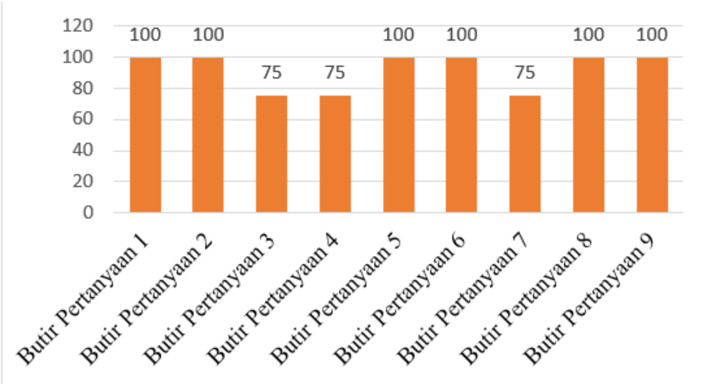


Figure 4. Assessment of teacher perception

The overall results of each aspect of the assessment achieved a score of 97% which was categorized as very practical. The results of the first question item, namely the H5P-based animation learning video as a whole, can attract the attention of students. This is supported by the assessment data obtained, which is 100% stated to be a high level of practicality in terms of attracting the attention of students.

The assessment of the second question item shows that the learning objectives have been clearly formulated and that there are navigation directions in the video that can be easily understood in the H5P-based animated learning video. 100% of educators consider that the learning objectives presented are quite relevant, and the navigation guide at the beginning of the video is exposed quite clearly.

The assessment of the third question item shows that the presentation of material in H5P-based animation learning videos is systematically arranged. This is evidenced by 75% of educators assessing the level of practicality in terms of presenting systematically arranged material which in this case makes it easier for students to understand the learning flow contained in the video.

The assessment of the fourth question item shows that the language in H5P-based animated learning videos is easy to understand. As many as 75% of educators assessed the level of practicality in terms of language in videos to be easy to understand.

The assessment of the fifth question item shows that H5P-based animation learning videos can be used anytime and anywhere. As many as 100% of educators assessed the level of practicality in terms of flexibility in the animated learning video, which allows participants to access the video without any space and time limits.

The assessment of the sixth question item shows that the animations/images/elements used can clarify the learning material. As many as 100% of educators consider that in terms of the elements contained in the learning video it helps in clarifying the content of the material, in which case every component contained in the video is well presented and uses high resolution so that each element can be clearly exposed.

The assessment of the seventh question item shows that the interactive questions/quizzes on the video are interesting and foster thinking skills. As many as 100% of educators consider that in terms of practicality, the interactive

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

questions/quizzes in the learning videos are very interesting and designed to stimulate students' thinking skills.

The assessment of the eighth question item shows that learning using the Lumi H5P application on algorithmic material arouses interest and curiosity. As many as 100% of educators consider that in terms of practicality, learning using the lumi education application arouses interest in students and curiosity so that it is able to create an interesting learning experience for students.

The assessment of the ninth question item shows that H5P-based animation learning videos are a new innovation as an Informatics learning medium. This is evidenced by 100% of educators considering that in terms of practicality, H5P-based animation learning videos are a new innovation as an informatics learning medium that can be accessed easily, flexibly, without hassle.

b) Assessment of Learner Responses

The student questionnaire test instrument consists of 20 questions, which are categorized into 3 parts, namely Skill Aspect, Learning Aspect, and Visual Communication Aspect. The following are the results of the assessment of students' response tests to the use of H5P-based animation learning videos presented in Figure 5.

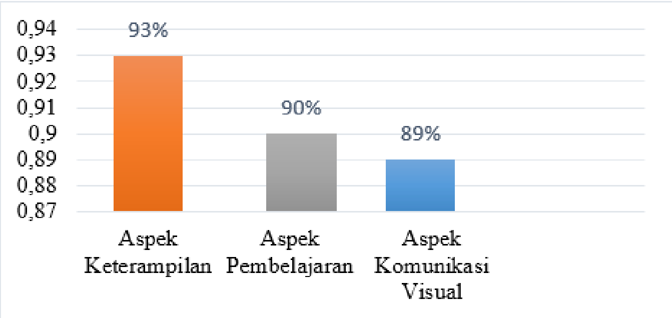


Figure 5. Assessment of Learner Responses

In the first aspect, namely the Skill Aspect, it received a very practical score with an average of 93% which shows that the majority of students have a fairly high ability to operate the interactive features provided in H5P-based animation videos. Where students are able to understand navigation, answer interactive quizzes, and follow learning steps independently without experiencing severe difficulties.

In the second aspect, namely the learning aspect, a very practical assessment was obtained with a score of 90% of the questionnaire given to students. These results show that most of the students feel that the use of H5P-based animation videos is effective in conveying concepts from Algorithm material which are often considered complex and able to attract students' attention and improve their understanding.

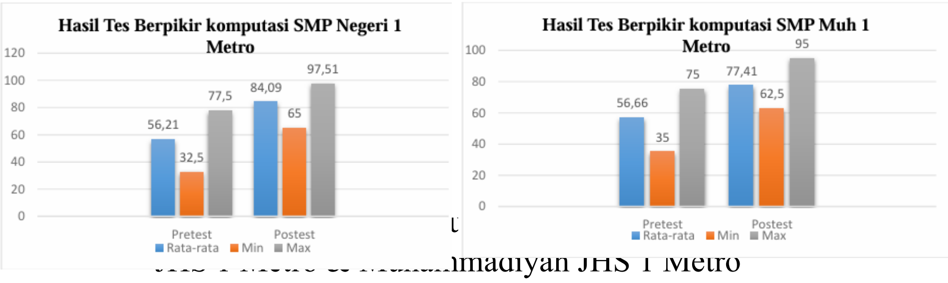
In the third aspect, namely the Visual Communication Aspect, a very practical score was obtained, namely 89% of the questionnaires given to students. These results show that each of the elements used in the H5P-based learning video is quite effective in describing the concept of Algortima, especially describing flowchart symbols to students. Based on the results of the scores obtained from the three aspects, the overall average of the three aspects was 91% which is categorized as very valid.

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

6. Product Effectiveness Test

The effectiveness of the H5P-based animation learning video product that has been developed is measured using a computational thinking evaluation test on the Algorithm material. The average results of the computational thinking test in students of State Junior High School 1 Metro and Muhammadiyah Junior High School 1 Metro are presented in Figure 6.



JHS 1 Metro & Muhammadiyah JHS 1 Metro

The results of the N-Gain test as presented in Figure 7.

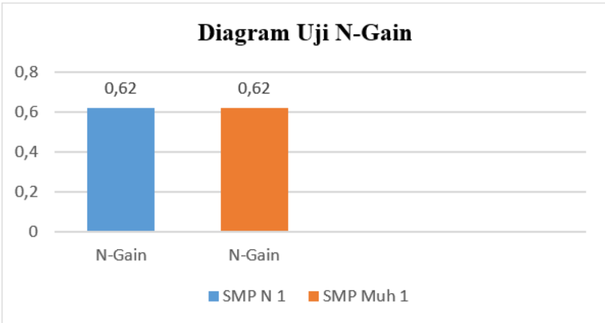


Figure 7. N-Gain test data for JHS 1 Metro and Muhammadiyah JHS 1 Metro

In the summary of quantitative data from Figures 6 and 7, it shows that there is a significant increase in students at Junior High School State 1 Metro after using H5P-based animation learning videos, with an average pretest score of 56.21 and an average post-test score of 84.09. The results of the N-Gain test on students of Junior High School State 1 Metro showed that the computational thinking test had an average N-Gain value of 0.62 or 62%. Meanwhile, in the summary of quantitative data in Figure 6, the results show that there is also a significant increase in students at Muhammadiyah Junior High School 1 Metro after using H5P-based animation learning videos, with an initial average pretest score of 56.66 and an average post-test score of 77.41. The results of the N-Gain test on Muhammadiyah 1 Metro Junior High School students showed that the computational thinking test had an average N-Gain value of 0.62, or 62%.

Based on the description of the effectiveness test from the two schools, this indicates that the use of H5P-based animation learning videos has a medium level of effectiveness in stimulating students' computational thinking skills. Academically, the medium N-Gain category may be attributed to several contributing factors. First, students were relatively unfamiliar with inquiry-based learning and the use of interactive digital media, which may have required an adaptation period before they could fully engage with the learning process. Second, the limited duration of the intervention conducted over only four meetings may not have been sufficient for students to internalize all aspects of

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

computational thinking. Third, variations in students' prior knowledge, digital literacy, and classroom learning environments may have also influenced the consistency of learning gains. Therefore, while the H5P-based animated learning videos significantly enhanced students' understanding, their overall improvement reached a moderate level due to these contextual and pedagogical factors.

Furthermore, the interactive features embedded in the H5P-based learning videos, such as quizzes, animations, and navigational controls. These features fostered active learning engagement by allowing students to interact with the content, receive immediate feedback, and control their learning pace. The quiz elements, in particular, supported the algorithmic thinking and decomposition aspects of computational thinking by encouraging students to solve problems step-by-step and reflect on their reasoning. Similarly, the animated visualizations facilitated abstraction by helping students visualize complex concepts in dynamic and intuitive ways (Mayer, 2009). The navigational interactivity enabled self-directed exploration, which aligns with the logical sequencing and pattern recognition skills essential to computational thinking (Wing, 2006).

In this regard, while the medium N-Gain results suggest that full mastery was yet to high achieved, the presence of these interactive H5P features demonstrates a clear positive correlation between multimedia interactivity and the stimulating of computational thinking. This finding aligns with previous studies indicating that interactive digital learning environments significantly enhance students' mathematical computational thinking (Anggraini et al., 2022), and Mayer's Cognitive Theory of Multimedia Learning (2009), which states that learning is most effective when learners actively integrate verbal and visual information through dual-channel processing. H5P-based learning videos provide multimodal stimuli combining animation, narration, and embedded quizzes that support the cognitive processes of selecting, organizing, and integrating information. The presence of interactive elements such as quizzes and navigation controls allows learners to manage their cognitive load, maintain attention, and receive immediate feedback, which are essential mechanisms for meaningful learning within Mayer's theoretical framework.

In addition, Wing's (2015) computational thinking theory emphasizes four key components; decomposition, pattern recognition, abstraction, and algorithmic. The interactive features in H5P directly support these four aspects. Interactive quizzes help develop algorithmic thinking through step-by-step problem-solving exercises; animations support abstraction by simplifying complex concepts; and interactive navigation encourages self-directed exploration that strengthens pattern recognition and logical sequencing skills. All of these elements foster computational thinking habits as described by Wing (2015), in which students learn to formulate, decompose, and solve problems systematically and repeatedly.

In summary, the integration of H5P-based multimedia learning aligns with Mayer's cognitive principles by optimizing cognitive processing, while also supporting Wing's computational thinking framework by reinforcing problem-solving patterns and reasoning. Therefore, H5P based learning animation video can helpful to stimulate students' computational thinking skills, and have any demonstrates the pedagogical potential of

Journal of Educational Technology:
Journal of Learning Research and Development
https://e-journal.undikma.ac.id/index.php/jtp/index

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 623-638

combining multimedia interactivity with inquiry-based learning to encourage deeper cognitive engagement and computational comprehension.

The findings of this study have several practical implications for educators. The integration of H5P-based animated learning videos in guided inquiry learning provides teachers with a rich pedagogical tool to improve students' computational thinking skills. Teachers can take advantage of H5P's interactive features such as embedded quizzes, animations, and branched navigation to encourage active engagement, self-paced learning, and provide hands-on feedback. Such features not only help manage students' cognitive load, but they also stimulate students' ability to break down complex problems, recognize patterns, and build algorithmic reasoning. In addition, the application of this interactive multimedia supports the cognitive principle of Mayer (2005) by optimizing the simultaneous processing of verbal and visual information. Therefore, teachers are advised to adopt and adapt an interactive multimedia learning environment that suits students' learning styles and technological readiness.

Conclusion

The conclusion of this study shows that the H5P-based animation learning video developed has characteristics in the form of the use of interesting animation elements, interactive quiz features to ensure understanding, ideal video duration, informative algorithm material, and quiz questions that encourage analytical thinking, so that it not only helps students understand the material concepts well, but also stimulates computational thinking skills. This learning video was declared suitable for use based on the results of the media and material validity test with scores of 3.91 and 3.75 respectively (very valid category), as well as the results of the practicality test by teachers and students with scores of 96% and 91% (very practical category). In addition, the effectiveness of this video in improving computational thinking skills is shown by the N-Gain value of 0.62 (medium category). Overall, based on the results of the validity, practicality, and effectiveness tests, H5P-based animated learning videos are suitable for use in the learning process to stimulate students' computational thinking skills.

Suggestion

Based on the results of the research that has been obtained, the researcher provides several suggestions for further development and research. 1). It is recommended to develop H5P-based animation learning videos in other subjects to improve students' computational thinking skills more broadly. 2). It is necessary to conduct experimental research by integrating H5P-based animated learning videos into collaborative learning models, so that the impact of the integration on improving students' computational thinking skills can be known. 3). In the development of animation learning videos in the future, it is recommended to utilize more capable software so that the resulting video becomes more interesting and rich in visual elements that can help visualize abstract concepts more clearly and effectively.

References

Angraini, L. M., Arcat, A., & Sohibun, S. (2022). Pengaruh Bahan Ajar Berbasis Multimedia Interaktif terhadap Kemampuan Computational Thinking Matematis Mahasiswa.

JNPM (Jurnal Nasional Pendidikan Matematika), 6(2), 370. https://doi.org/10.33603/jnpm.v6i2.6937
Arikunto, S. (2011). *Prosedur Penelitian: Suatu Pendekatan Praktik.* Jakarta: Rineka Cipta.
Bocconi, S., Chioccariello, G. A., Dettori, A. F., & Engelhardt, K. (2016). Developing Computational Thinking in Compulsory Education. In *Joint Research Centre (JRC)* (issue June). https://doi.org/10.2791/792158
Bray, D. A., Girvan, D. C., & Chorcora, E. N. (2023). Students' perceptions of pedagogy for 21st century learning instrument (S-POP-21): Concept, validation, and initial results. *Thinking Skills and Creativity*, *49*. https://doi.org/10.1016/j.tsc.2023.101319
Ghaljaei, F., Hastings-tolsma, M., Rezaee, N., (2022). Jo your na l P of. *Pediatrics & Neonatology*, 105164. https://doi.org/10.1016/j.compedu.2024.105164
Gulo, Y. T. M., Nasution, A. K., Batubara, B. M., & Waruwu, S. (2021). *Lamp of the community*. *3200*(2), 83–94. https://doi.org/10.31289/pelitamasyarakat.v2i2.4419
Guntara, Y. (2021). Normalized gain measures of treatment effectiveness. *Sultan Ageng Tirtayasa University*, *March*, 1–3. https://doi.org/10.13140/RG.2.2.27603.40482
Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six thousand-student survey of mechanics test data for introductory physics courses. American Journal of Physics, 66(1), 64 74. https://doi.org/10.1119/1.18809
Irawan, A., & Hakim, M. A. R. (2021). The Practicality of Mathematics Comic Learning Media in Grade VII Junior High School/MTs Collection Materials. *Pythagoras: Journal of the Mathematics Education Study Program*, *10*(1), 91–100. https://doi.org/10.33373/pythagoras.v10i1.2934
Lestari, A. C., & Annizar, A. M. (2020). Students' Critical Thinking Process in Solving PISA Problems Reviewed from Computational Thinking Skills. *Journal of Science*, *8*(1), 46–55. https://doi.org/10.31629/kiprah.v8i1.2063
Lukman, A., Hayati, D. K., & Hakim, N. (2019). Development of Local Wisdom-Based Animation Videos in Class V Science Learning in Elementary Schools. *Elementary: Scientific Journal of Elementary Education*, *5*(2), 153. https://doi.org/10.32332/elementary.v5i2.1750
Mayer, R. (2005). *Multimedia learning 1 A Cognitive Theory of Multimedia Learning: Implications for Design Principles*. https://www.researchgate.net/publication/248528255
Mayer, R. E. (2009). *Multimedia Learning*. Cambridge University Press.
Nieveen, N. (1999a). Prototyping to Reach Product Quality. *Design Approaches and Tools in Education and Training*, 125–135. https://doi.org/10.1007/978-94-011-4255-7_10
Pangestu, A. R. (2021). Development of Stop Motion Animation Video-Based Learning Media in Geography Subjects. *Geodics: Journal of Geography Science and Education Studies*, *5*(2), 216–225. https://doi.org/10.29408/geodika.v5i2.3807
Schez-Sobrino, S., Vallejo, D., Herrera, V., Glez-Morcillo, C., Castro-Schez, J. J., & Albusac, J. (2024). Interactive Video Application: A web-based open-source framework to build interactive videos. *SoftwareX*, *27*(September 2023). https://doi.org/10.1016/j.softx.2024.101772
Wing, J. M. (2006). Computational thinking. *Communications of the ACM, 49*(3), 33–35.123
Wing, J. M. (2015). *Computational Thinking and Thinking About Computing. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 367(1898), 3717–3725.