

DEVELOPMENT OF INTERACTIVE EDUCATIONAL MULTIMEDIA USING CANVA FOR THE TOPIC OF SYSTEM OF LINEAR INEQUALITIES IN TWO VARIABLES FOR 10TH GRADE

Gitami Suleman^{1*}, Hasan S. Panigoro², Taulia Damayanti³
Pendidikan Matematika^{1,2,3}, Matematika dan Ilmu Pengetahuan Alam^{1,2,3},
Universitas Negeri Gorontalo^{1,2,3}
sulemangitami8@gmail.com¹, hspanigoro@ung.ac.id², taulia@ung.ac.id³

Abstrak

This study aims to develop a Canva-based interactive multimedia published as a website multimedia learning tool on the topic of System of Linear Inequalities in Two Variables that is suitable for use in the mathematics learning process. This study employs the Research and Development (R&D) method using the ADDIE development model, which consists of the Analysis, Design, Development, Implementation, and Evaluation stages. The analysis stage involved identifying needs, learner characteristics, the curriculum, content, as well as the learning environment and resources. The design stage included formulating learning objectives, designing the presentation flow, user interface, storyboard, and research instruments. Subsequently, in the development stage, a website-based educational multimedia was created and validated by subject matter experts and media experts. The results of the study indicate that the developed educational multimedia meets the feasibility criteria and can be used in the learning process. This educational multimedia is expected to help students understand the material more easily and increase their interest in the learning process.

Keywords : *Interactive Educational Multimedia; Websites; Canva.*

A. Introduction

Mathematics plays a vital role in the advancement of science, technology, and human activities (Omer et al., 2025). Although this discipline is designed to sharpen students' thinking skills, making them more systematic, logical, creative, and critical, many students still find mathematics challenging. The abstract nature of mathematical concepts often hinders students' understanding, which ultimately impacts their motivation and academic performance (Pauweni et al., 2022).

The topic of Systems of Linear Equations in Two Variables (SLITV) is a key pillar of the 10th-grade mathematics curriculum; however, students often face significant pedagogical challenges and learning difficulties in mastering it thoroughly. These difficulties stem from various learning obstacles, which are

classified into ontogenetic, didactic, and epistemological barriers. Ontogenetic barriers generally arise due to students' lack of basic mathematical knowledge, while epistemological barriers are evident when students struggle to translate real-world problems into abstract mathematical models (Bakar et al., 2019 ; Raudiyah & Suryadi, 2023). Additionally, didactic obstacles frequently occur due to teachers' inadequate teaching methods that fail to meet students' intellectual needs (Bakar et al., 2019). Research indicates that the majority of students (approximately 71%) experience significant difficulties in determining solutions to algebraic forms of linear equation systems, suggesting a deep-seated weakness in selecting and applying mathematical procedures (Fatio et al., 2020). This problem is exacerbated by traditional teaching methods, such as rote learning and textbook-based instruction, which fail to engage students actively and are unable to effectively address these conceptual gaps (Mustafa et al., 2026 ; Sharma et al., 2020).

The significant gap between conventional teaching methods and the need for interactive visualization in SPtLDV learning is a critical issue that must be addressed immediately. Traditional approaches that rely heavily on static, text-based instruction have proven incapable of accommodating the learning preferences of today's students, who tend to prefer visual and interactive elements (Mustafa et al., 2026 ; Raviv & Yepes, 2024 ; Sharma et al., 2020). Consequently, these conventional methods fail to bridge students' theoretical understanding with its practical application, leaving a significant gap when students are faced with non-routine problem-solving (Inayah et al., 2025 ; Raudiyah & Suryadi, 2023). Conversely, the integration of interactive visualization tools such as GeoGebra has been shown to significantly improve students' mathematics learning outcomes, with students learning with the aid of visualization technology outperforming those taught traditionally (Mustafa et al., 2026). Interactive visualization has been shown to strengthen students' ability to understand abstract concepts, optimize cognitive engagement, and build a deeper mathematical understanding (Borboeva et al., 2025 ; Mikhailutsa et al., 2023). The extraordinary potential of these algorithmic visualization and 3D modeling techniques underscores the importance of implementing adaptive interactive visualization technologies to address conceptual barriers in SPtLDV course material (Zhang, 2024). Given that students show a

strong preference for visual methods, the transition to interactive digital learning media is an academic necessity (Raviv & Yepes, 2024).

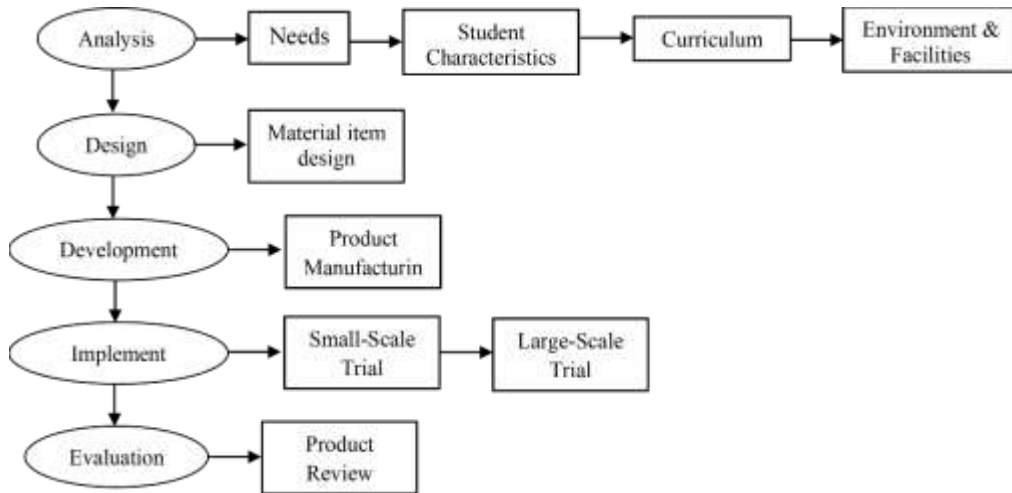
Technology and web-based learning platforms offer significant opportunities to manage cognitive load while enhancing student motivation in mathematics education. When designed effectively, web-based digital learning platforms that integrate videos, simulations, and interactive quizzes can reduce extraneous cognitive load while increasing germane cognitive load, thereby dramatically improving learning efficiency and student interest (Widhanarto et al., 2025). Adaptive interfaces in online learning systems can also dynamically adjust the complexity of the material based on user behavior to prevent cognitive strain (Suryani et al., 2025). However, media designers must be cautious because poor interface design or excessive use of multimedia elements can actually trigger cognitive overload, which hinders learning effectiveness (Twabu et al., 2026). Amid these developments, the use of Canva as a graphic design platform has become a topic of widespread discussion in academic circles due to its potential for creating an interactive and visually appealing learning environment. Canva is widely recognized for its ability to enhance creativity, collaboration, and active student engagement through the availability of ready-to-use templates, infographics, and interactive materials that align the learning process with 21st-century skills (Hinchcliff & Mehmet, 2023; Miranda & Enciso, 2023; Ngoc & Nguyen, 2025). The successful integration of Canva across various fields such as English as a Foreign Language (EFL), marketing, and computer science demonstrates that engaging visual materials can significantly strengthen information retention and motivate learners (Huda et al., 2025).

Although interactive mathematics platforms have advanced significantly, most still face serious limitations in terms of accessibility, user interface design, and inclusive pedagogical integration. Many math platforms fail to accommodate the needs of students with physical disabilities or visual impairments, and offer very limited and rigid interactions (Brzostek-Pawłowska et al., 2019; Rossi & Fornaro, 2024; Shoaib et al., 2024). In terms of interface, the mathematical input systems on existing platforms are often unintuitive, overly complex, and tend to be geared toward expert users rather than novice (Pollanen et al., 2017). Pedagogically, these

platforms also frequently neglect integration with active learning methodologies such as problem-based learning (PBL) (Valero Larico et al., 2026). To address this gap, the development of interactive learning websites based on Canva offers a unique and innovative solution. Canva provides user-friendly templates and drag-and-drop features that simplify navigation and reduce the learning curve for beginners (Ngoc & Nguyen, 2025). Canva's multimedia capabilities also allow for the integration of text, audio, and visual alternatives that support inclusive design principles for students with special needs (Huda et al., 2025). Furthermore, this platform facilitates the creation of PBL-based interactive modules and formative assessments that provide immediate feedback (Barana et al., 2021; Putri & Rusnilawati, 2026). Therefore, this study aims to develop an interactive multimedia learning website using Canva on the topic of SPtLDV for 10th grade, focusing on usability—such as appeal, efficiency, and ease of learning (Sukardjo & Sugiyanta, 2018), to guide students in overcoming conceptual difficulties in connecting algebraic representations with graphical solutions (Çekmez, 2023).

B. Method

The method used in this study is Research and Development (R&D), employing the ADDIE development model, which consists of five systematic stages: Analysis (analysis of needs, learner characteristics, curriculum, as well as environment and resources), Design (formulation of learning objectives, flow design, interface design, storyboard development, and instrument framework design), Development (product creation, expert validation, and product revision), Implementation (small-scale and large-scale trials), and Evaluation (assessment of the final product). The scope and subject of this study focus on testing the feasibility of an interactive multimedia learning product on the topic of Two-Variable Linear Inequalities, intended for 10th-grade students. The entire series of research and testing activities was conducted at the research site located at SMA Muhammadiyah Unggulan in Gorontalo City.



Gambar 1. The Research Process in the ADDIE Model (Kobandaha et al., 2022)

The data collection methods used in this study were limited to three main techniques: observation, interviews, and questionnaires. The observation technique was employed during the Analysis phase to directly observe ideal conditions, constraints in the learning process, and the availability of supporting facilities and infrastructure in the field. Structured interviews were conducted with relevant parties, such as subject teachers, to gather in-depth data regarding user characteristics and required product specifications. Meanwhile, the questionnaire technique was used during the Development and Implementation phases in the form of structured evaluation sheets using a Likert scale to collect evaluation data from subject matter experts and media experts, as well as user response questionnaires to measure product usability.

The validation test was conducted by distributing an assessment instrument in the form of a questionnaire to media experts and subject matter experts using a Likert scale ranging from 1 to 4 as follows.

Table 1. Expert-Validated Likert Scale

Score	Description
4	Excellent
3	Good
2	Fair
1	Very Poor

Next, the collected data will be analyzed by calculating the average score using the following formula:

$$Validity = \frac{\sum x}{\sum s} \times 100\%$$

The analysis continued using a combined validation calculation based on the following formula:

$$Percentage V_{total} = \frac{Validity\ score}{Many\ validators}$$

The score will then be converted into a qualitative rating based on the validity criteria in the following table:

Table 2. Success Criteria Validation

Score Percentage	Criteria
85% < KV ≤ 100%	Highly Valid
71% < KV ≤ 85%	Valid
51% < KV ≤ 70%	Fairy Valid
0% ≤ KV ≤ 50%	Invalid

(Abubakar et al., 2025) (Modified)

A feedback questionnaire was distributed to teachers and students after they used the multimedia learning materials. The statements in the questionnaire covered aspects of ease of use, clarity of presentation, appeal of the media, and the media's effectiveness in helping students understand SPtLDV material. Teachers and students could rate each response item on a scale of Strongly Agree (4), Agree (3), Somewhat Agree (2), and Disagree (1). The Likert scale is as follows :

Table 3. Likert Scale for Multimedia Usability

Score	Description
4	Strongly Agree
3	Agree
2	Somewhat Disagree
1	Disagree

Next, the average score for each item in the questionnaire will be calculated using the following formula:

$$Practicality = \frac{\sum x}{\sum s} \times 100\%$$

The analysis continued using a combined practicality calculation based on the following formula:

$$Overall Practicality (K) = \frac{Practicality\ score}{Many\ validators}$$

Next, convert the average score obtained into a qualitative grade according to the following table

Table 4. Multimedia Practicality Criteria

Score Percentage	Criteria
80% < K < 100%	Very Practical
61% < K ≤ 80%	Practical
41% < K ≤ 60%	Fairly Practical
0% ≤ K ≤ 40%	Not Practical

(Damayanti et al., 2025) (Modified)

C. Results and Discussion

This research and development project resulted in the creation of interactive educational multimedia on the topic of System of Linear Inequalities in Two Variables, using the ADDIE model, which consists of the following stages: analysis, design, development, implementation, and evaluation. Each stage was carried out systematically to produce a product suitable for use in the mathematics learning process.

During the analysis phase, observations and interviews were conducted with mathematics teachers to identify learning needs. The results of the analysis showed that the mathematics learning process still relied on limited teaching materials, such as textbooks and lecture-based methods. In addition, students experienced difficulties in understanding the material on systems of linear inequalities with two

variables, particularly in graphing and determining the solution set. These difficulties caused students to be less active and less engaged during the learning process.

Based on these analysis results, the design phase of interactive learning multimedia tailored to student characteristics was carried out. The product was designed as a website containing a main page, user guide, learning outcomes, learning objectives, content, instructional videos, practice problems, quizzes, and assessments. Subsequently, during the development phase, the multimedia was created using Canva and published as a website.

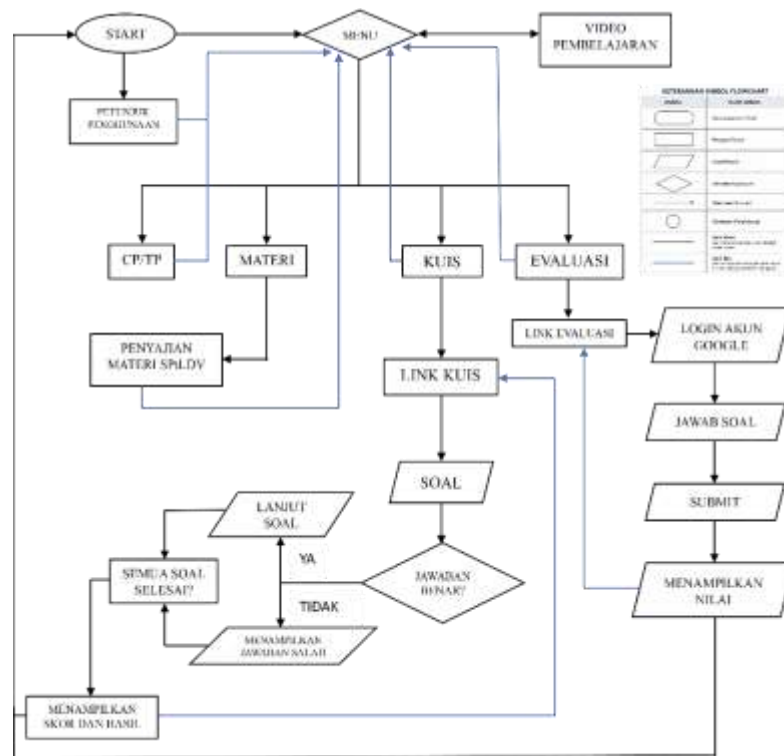











Figure 2. Flowchart of Educational Multimedia Development

During the development phase, we created interactive, website-based educational multimedia using Canva in accordance with the design developed in the previous phase. The following table outlines the multimedia product development process.

Table 5. Interactive Multimedia Learning Interface

NO	Tampilan Antarmuka	Keterangan
1.		<p>Menampilkan halaman awal (<i>home screen</i>) atau menu utama dari media pembelajaran "Lineapolis" pada materi Sistem Pertidaksamaan Linear Dua Variabel. Halaman ini menyediakan tombol utama "PLAY" untuk memulai masuk ke dalam media serta tombol "PETUNJUK PENGGUNAAN" pada pojok kiri atas untuk mengakses panduan navigasi bagi pengguna.</p>
2.		<p>Menyediakan informasi mengenai arti dan fungsi dari setiap ikon navigasi serta ikon menu yang digunakan di dalam media pembelajaran. Halaman ini memuat panduan untuk ikon kontrol (<i>Petunjuk Penggunaan, Mulai, Tampilan Awal, Selanjutnya, Sebelumnya</i>) serta ikon menu konten pembelajaran (<i>CP/TP, Materi, Video Pembelajaran, Kuis, Evaluasi</i>) guna mempermudah pengguna dalam mengoperasikan media.</p>
3.		<p>Menampilkan halaman navigasi utama berupa peta interaktif ("Peta Lineapolis") yang berfungsi sebagai menu pilihan materi dan aktivitas pembelajaran. Halaman ini menyediakan akses langsung ke berbagai fitur melalui pin lokasi, yaitu menu CP & TP, Materi, Video Pembelajaran, Kuis, dan Evaluasi.</p>
4.		<p>Menampilkan informasi mengenai Capaian Pembelajaran (CP) dan Tujuan Pembelajaran (TP) yang harus dicapai oleh peserta didik pada materi Sistem Pertidaksamaan Linear Dua Variabel. Halaman ini berfungsi memberikan arah pembelajaran dan dilengkapi dengan tombol</p>

NO	Tampilan Antarmuka	Keterangan
5.		<p><i>Home</i> di pojok kiri atas untuk kembali ke peta utama.</p> <p>Menyajikan pemaparan materi pembelajaran dari Sistem Pertidaksamaan Linear Dua Variabel (SPtLDV). Halaman ini dilengkapi dengan tombol navigasi <i>Home</i> di pojok kiri atas dan tombol <i>Selanjutnya</i> di pojok kanan atas untuk berpindah halaman.</p>
6.		<p>Menampilkan halaman yang memuat video pembelajaran interaktif untuk memperkuat pemahaman peserta didik melalui penyampaian materi secara audio-visual. Halaman ini dilengkapi dengan tombol <i>Home</i> di pojok kiri atas untuk kembali ke menu peta utama.</p>
7.		<p>Menyediakan akses interaktif melalui kode QR (<i>QR Code</i>) yang berfungsi untuk mengarahkan peserta didik ke tautan atau sumber digital eksternal pendukung pembelajaran (seperti kuis daring). Halaman ini didesain dengan ilustrasi karakter bertema kota futuristik, serta dilengkapi tombol <i>Home</i> di pojok kiri atas untuk menavigasi kembali ke menu utama.</p> <p>Menampilkan halaman kuis interaktif yang berisi butir soal latihan untuk menguji pemahaman peserta didik mengenai materi SPtLDV. Halaman ini menyajikan pertanyaan pilihan ganda dengan opsi jawaban yang didesain menarik menyerupai sampul buku, serta dilengkapi dengan navigasi dan penunjuk nomor soal (seperti "1 of 20") di bagian bawah layar.</p>

NO	Tampilan Antarmuka	Keterangan
		<p>Menyediakan dua alternatif metode akses bagi peserta didik untuk menuju ke tautan digital eksternal (seperti LKPD atau instrumen evaluasi), yaitu melalui pemindaian kode QR (<i>QR Code</i>) atau dengan menekan tombol interaktif "Klik". Halaman ini dilengkapi tombol <i>Home</i> di pojok kiri atas untuk navigasi kembali ke peta utama.</p>
8.		<p>Menampilkan lembar hasil atau umpan balik (<i>feedback</i>) dari pengerjaan soal evaluasi mandiri mengenai materi SPtLDV. Halaman ini menyajikan butir-butir soal pilihan ganda yang dilengkapi dengan indikator penilaian (seperti tanda silang merah) untuk menunjukkan kesalahan pengerjaan, sehingga memudahkan peserta didik melakukan peninjauan kembali (<i>review</i>) terhadap jawaban mereka.</p>

After the multimedia was developed, the product was validated by subject matter experts and media experts to determine its validity before it was tested on students. Validation by subject matter experts was based on curriculum, content, and language aspects, while validation by media experts was based on appearance, navigation, interactivity, and consistency. Based on the experts' evaluations, the following validity assessment results were obtained from the media and subject matter experts

Table 6. Results of Subject Matter Expert Validation

NO	Indicator	Score for Each Aspect	Maximum Score	Percentage	Criteria
1.	Curriculum	25	32	78,12%	Valid
2.	Content	24	32	75%	Valid
3.	Language	21	24	87,5%	Valid
Overall Score		70	89	79,54%	Valid

Based on Table 6, it is evident that in the expert evaluation, the learning materials have three assessment aspects that meet the **Valid** criteria. The curriculum indicator scored 78.12%, the content assessment indicator scored 75%, and the linguistic indicator scored 87.5%, resulting in an overall score of 79.54% that meets the **Valid** criteria. Therefore, the interactive learning multimedia supported by Canva has been developed and considered suitable for pilot testing. However, the validators provided several suggestions for improvement, such as refining the quiz interface, adjusting some questions and answer keys, adding detailed solution steps to the content, and improving audio quality. These suggestions and feedback will serve as the basis for revisions aimed at enhancing the quality of the developed learning multimedia.

Table 7. Media Expert Validation Results

NO	Indicator	Score for Each Aspect	Maximum Score	Percentage	Criteria
1.	Appearance	24	32	75%	Valid
2.	Navigation	26	32	81,25%	Valid
3.	Interactivity	20	24	83,33%	Valid
4.	Consistency	19	24	79,16%	Valid
Overall Score		89	112	79,46%	Valid

Based on Table 7, it is evident that the presentation indicator scored 75%, the navigation indicator scored 81.25%, the interactivity indicator scored 83.33%, and the consistency indicator scored 79.16%, resulting in an overall score of 79.46%. When compared to the validation success table presented earlier, the expert validation of the interactive educational multimedia product falls under the **Valid** criterion. However, there are several points that need attention and improvement to enhance the developed product so that it can be effectively used by students.

After the revisions were made, the educational multimedia proceeded to the implementation phase through small-scale and large-scale trials. In the small-scale trial, the subjects were 5 tenth-grade students. The results of the small-scale trial were obtained based on questionnaires regarding student and teacher responses to the educational multimedia that had been used. The students' responses can be seen in the following table

Table 9. Teachers' Responses

Respondent	Total Score	Maximum Score	Percentage	Average Percentage
1	48	52	92,31%	90,38%
2	36	52	88,46%	

Based on the results of the teacher response questionnaire, 90.38% of respondents rated the learning media as **Very Practical**. Teachers stated that the developed learning media could support the learning process and capture students' interest.

A large-scale pilot test was conducted after the learning media were revised based on the results of the small-scale pilot test. This stage aimed to determine the practicality of the learning media with a larger number of students. The subjects in the large-scale pilot test consisted of 23 tenth-grade students, and the results were obtained from a student response survey regarding the learning media that had been used. The complete survey data can be seen in the following table.

Table 10. Student Response Results

Respondent	Total Score	Maximum Score	Percentage	Average Percentage
1	31	40	77,5%	81,96%
2	29	40	72,5%	
3	32	40	80%	
4	36	40	90%	
5	35	40	87,5%	
6	31	40	77,5%	
7	34	40	85%	
8	34	40	85%	
9	31	40	77,5%	
10	36	40	90%	
11	34	40	85%	
12	37	40	92,5%	
13	30	40	75%	
14	32	40	80%	
15	30	40	75%	
16	36	40	90%	
17	30	40	75%	
18	27	40	67,5%	
19	31	40	77,5%	
20	36	40	90%	
21	35	40	87,5%	
22	38	40	95%	
23	29	40	72,5%	

Based on the table, the practicality rate was found to be 81.96%, falling into the **Very Practical** category. This indicates that the developed learning media is easy to use, engaging, and helps students understand the learning material.

During the evaluation phase, a comprehensive assessment was conducted of the validation results, pilot test results, and product revisions made at each stage of development. Based on the evaluation results, the interactive learning multimedia was deemed suitable for use as a mathematics learning medium for the topic of two-variable linear systems of inequalities. The developed learning multimedia is capable of helping students understand the material more easily, increasing their interest in learning, and creating a more interactive and effective learning process.

The results of this study are consistent with the research conducted (Aisyah et al., 2021) on the development of web-based interactive learning media for linear equations and inequalities with one variable using the ADDIE model. That study showed that the developed learning multimedia was valid, effective, and practical for use in the learning process. The similarity between that study and this one lies in the use of the ADDIE development model, which includes the analysis, design, development, implementation, and evaluation stages to produce learning multimedia suitable for use. In addition, both studies developed interactive mathematics learning multimedia to help students understand the material more easily.

D. Kesimpulan

Based on the results of research and development of a Canva-assisted, website-based interactive educational multimedia on the topic of Two-Variable Linear Inequality Systems (SPtLDV) for 10th-grade students, it can be concluded that the developed multimedia meets the criteria for suitability for use in the learning process. This is demonstrated by the results of validation by subject matter experts and media experts, which received a **Valid** rating; thus, the multimedia was deemed suitable for use after revisions were made in accordance with the validators' feedback.

Furthermore, the results of small-scale and large-scale trials indicate that the developed educational multimedia received a positive response from students,

earning the **Very Practical** category. The use of website-based interactive educational multimedia supported by Canva helps students understand the material on Systems of Linear Inequalities in Two Variables through a presentation that is more engaging, interactive, and easily accessible. Thus, the educational multimedia developed can be used as an alternative mathematics learning medium to support a more effective learning process.

Nevertheless, this study still has several limitations, such as the need for supporting devices, unstable internet connections, limited access to learning resources during implementation, and a research sample that is still confined to a single school. Therefore, future research is expected to develop multimedia with more optimal features and involve a broader research sample, thereby improving the quality and effectiveness of the use of educational media.

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