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DEVELOPMENT OF INTERACTIVE ALGEBRA LEARNING VIDEOS TO IMPROVE JUNIOR HIGH SCHOOL STUDENTS' LEARNING OUTCOMES

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ABSTRACT

This study aims to develop an interactive learning video for algebra materials and to examine its feasibility, practicality, attractiveness, and effectiveness in improving students' learning outcomes at SMP Taman Siswa Teluk Betung, Bandar Lampung. The research employed a Research and Development (R&D) method using the ADDIE model, which consists of analysis, design, development, implementation, and evaluation stages. Data were collected through questionnaires, test, and documentation. Quantitative data were analyzed using Likert-scale percentage analysis, while qualitative data in the form of expert feedback were used to revise the developed product. The validation results indicated that the learning video was valid in terms of content, with an average score of 4.6, very valid in media aspects with a score of 4.5, and valid in language aspects with a score of 4.45. The implementation results showed that teachers rated the video as very practical with a score of 4.9, students perceived it as attractive with a score of 4.0, and student learning mastery reached 81.48%, exceeding the minimum mastery criterion. These findings indicate that interactive learning videos are feasible and effective as instructional media to enhance students' understanding of algebra concepts and improve learning outcomes in junior high school mathematics.

ABSTRAK

Penelitian ini bertujuan untuk mengembangkan video pembelajaran interaktif pada materi aljabar serta mengetahui tingkat kelayakan, kepraktisan, kemenarikan, dan efektivitasnya dalam meningkatkan hasil belajar siswa di SMP Taman Siswa Teluk Betung, Bandar Lampung. Metode penelitian yang digunakan adalah Research and Development (R&D) dengan model ADDIE yang meliputi tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Teknik pengumpulan data dilakukan melalui angket validasi ahli, angket respons guru dan siswa, tes hasil belajar, serta dokumentasi. Data kuantitatif dianalisis menggunakan persentase skala Likert, sedangkan data kualitatif berupa saran dan masukan ahli digunakan sebagai dasar revisi produk. Hasil validasi menunjukkan bahwa video pembelajaran dinilai valid pada aspek materi dengan skor rata-rata 4,6, aspek media 4,5, dan aspek bahasa 4,45. Hasil uji coba menunjukkan bahwa guru menilai

media sangat praktis dengan skor 4,9, siswa menilai media menarik dengan skor 4,0, serta tingkat ketuntasan belajar siswa mencapai 81,48%, melampaui kriteria ketuntasan minimal. Dengan demikian, video pembelajaran interaktif dinyatakan layak dan efektif sebagai media pendukung pembelajaran aljabar di SMP.

Introduction

Education is a process of interaction between teachers and students in developing knowledge, attitudes, and skills. Based on Law No. 20 of 2003, education is defined as a conscious and planned effort to create a learning atmosphere that enables students to develop their potential in spiritual, intellectual, emotional, social, and skill-related aspects. Therefore, education emphasizes not only academic achievement but also character building, emotional intelligence, noble character, and the ability to adapt to the times (Acetylena & Sirojuddin, 2025). The development of science and technology (IPTEK) has also significantly influenced education through various learning media, ranging from visual and audio to interactive multimedia (Fitri Mulyani, 2021). These media serve as auxiliary tools that make learning more effective, enjoyable, and capable of increasing student motivation (Ali et al., 2025). However, in reality, technology utilization remains limited; many teachers have not optimally used interactive media, despite its high relevance for challenging subjects like mathematics, as it can present abstract concepts concretely through visualization, animation, and interactive exercises with immediate feedback (Mukhtar, 2022).

Algebra is widely recognized as one of the most challenging topics for junior high school students due to its abstract symbols and variable manipulation, which often require higher-order thinking skills that students have not fully developed (Husen & Jumroh, 2025). Interviews with seventh-grade mathematics teachers at SMP Taman Siswa Teluk Betung, Bandar Lampung, revealed that although digital facilities such as projectors, computers, and internet access are available, teachers still tend to use conventional methods, including lectures, assignments, and simple Q&A sessions. Consequently, learning interaction is limited, student participation is low, and understanding tends to be rote-based. Students rely heavily on handbooks, making abstract material like algebra difficult to understand applicatively. The lack of media variety makes learning monotonous, reduces concentration, and fails to accommodate different learning styles (Zahrah & Agustin, 2025). Another obstacle faced by teachers is the time constraint in designing interactive media and the lack of training in using educational

technology. This condition underscores the need for innovation through the development of interactive media to enhance student effectiveness, motivation, and engagement. Interactive media not only presents attractive visualizations and animations but also enables two-way interaction between students and the learning material (Melati et al., 2023).

Preliminary observations at SMP Taman Siswa Teluk Betung revealed that more than 60% of seventh-grade students scored below the minimum mastery criterion on algebra topics, particularly in simplifying algebraic expressions and solving contextual problems. Although interactive learning media have been widely developed, most existing studies focus on general mathematics topics or use non-interactive video formats. Limited research specifically addresses the development of interactive algebra learning videos that integrate visualization, student interaction, and immediate feedback tailored to junior high school students' cognitive characteristics.

Based on these issues, the researcher is interested in conducting a study titled "Development of Interactive Learning Videos on Algebra Material for Seventh-Grade Students at SMP Taman Siswa Teluk Betung, Bandar Lampung." According to (Nabila et al., 2023), learning media is a tool that facilitates material delivery while maintaining student interest. This aligns with (Ghifari et al., 2022), who state that media is a communication channel encompassing film, television, diagrams, printed materials, computers, and instructors. Thus, learning media can be understood as anything that assists in delivering instructional messages to attract students' attention, interest, and feelings toward achieving learning goals (Astuti et al., 2024).

Furthermore, (Limbong et al., 2022) define interactive media as a computer-controlled delivery system where students do not merely watch and listen but also provide active responses that influence the pace and sequence of the presentation. Meanwhile, (Fauziah et al., 2025) explain interactive multimedia as a learning medium that can be operated directly by users with control tools, integrating various media elements. Based on expert opinions, interactive media can be summarized as technology-based learning tools that enable two-way communication between students and material through the integration of text, images, sound, animation, and digital simulation. Interactive features allow students to respond actively, ensuring they are not passive recipients of information but are involved in directing the course of learning.

According to (Lesmana & Santoso, 2023), interactive learning videos are media that combine sound, motion, images, text, and graphics in an interactive format to connect material with the user. (Octaviani et al., 2024) add that the

advantage of interactive video is its ability to make the learning process more effective and support the achievement of learning objectives. (Biassari & Putri, 2021) even refer to interactive video as a storytelling-based audio-visual method that involves students as active participants in the learning experience. From these various perspectives, it can be concluded that interactive learning video is an audio-visual medium that dynamically integrates sound, text, images, and graphics to create an engaging, interactive learning experience that supports two-way communication. The presence of interactive video not only increases student motivation and engagement but also assists teachers in evaluating students' understanding of the material, making learning more effective and ensuring educational goals are met.

Therefore, this study aims to develop an interactive learning video for algebra material and to examine its feasibility, practicality, attractiveness, and effectiveness in improving seventh-grade students' learning outcomes. The results of this study are expected to provide pedagogical contributions to mathematics education, particularly in supporting the teaching of abstract concepts through interactive digital media.

Method

This study employed a Research and Development (R&D) approach using the ADDIE model, which consists of five stages. The analysis stage aimed to identify students' learning difficulties and media needs in algebra. The design stage focused on planning the structure, content, and interactive features of the learning video. The development stage involved producing the video and conducting expert validation. The implementation stage aimed to test the product with students and teachers in a real classroom setting at SMP Taman Siswa Teluk Betung. Finally, the evaluation stage was conducted to assess the feasibility, practicality, attractiveness, and effectiveness of the developed media. Questionnaires were completed by expert validators (material, media, and language experts), mathematics teachers, and students. The post-test was designed to measure students' learning outcomes in algebra after using the interactive learning video. All instruments were validated by experts prior to implementation to ensure content validity and reliability. Quantitative data from questionnaires and post-tests were analyzed using percentage-based Likert scale analysis, while qualitative feedback from expert validators was used to revise and improve the learning video.

Results and Discussion

This stage was carried out as the foundation and the initial step in developing the research product. The analysis phase included a needs analysis,

curriculum analysis, and an analysis of student characteristics at SMKS Taman Siswa Teluk Betung, Bandar Lampung. Subsequently, the researcher proceeded to the design stage. Activities performed during this stage included: (1) designing learning media using the Canva application to create images, animations, video editing, and audio processing, as well as integrating learning videos with PowerPoint through the hyperlink feature, with additional audio editing supported by CapCut; (2) preparing learning materials; (3) drafting media research instruments; and (4) developing teaching modules. In the development stage, the researcher compiled and refined the media design prior to the validation process. Once the design was finalized, the product was validated by media experts, material experts, and language experts.

1. Material Expert Validation

Based on the validation results by material experts, the content feasibility aspect obtained an average score of 4.45 (Valid). The presentation feasibility aspect achieved an average score of 4.75 (Valid). Overall, the material assessment reached an average score of 4.6, categorized as "Valid.**"**

2. Media Expert Validation

Validation by media experts yielded several assessments. The initial interface attractiveness score was 5 (Very Valid). The media content attractiveness score was 4 (Valid). Media design organization scored 4 (Valid). Font type and size selection scored 4 (Valid). The alignment of images with the material scored 5 (Very Valid). Text readability scored 5 (Very Valid). Color selection scored 5 (Very Valid). Finally, the consistency between the story, images, and material scored 4 (Valid). Overall, the media validation score was 4.5 (Valid). Thus, it can be concluded that the learning video media requires no revision as it has been declared valid by the validators.

3. Language Expert Validation

Language validation results showed an average score of 4.7 (Valid) for clarity/directness. The communicative aspect scored 5 (Very Valid). The dialogic and interactive aspect scored 4.5 (Valid). Compliance with language rules scored 4 (Valid). The use of language, terms, and icons scored 4.5 (Valid). Meanwhile, the correlation between oral and visual language scored 4 (Very Valid). Overall, the language validation obtained an average score of 4.45 (Valid). Consequently, the learning video media requires no revision.

The next stage is implementation through field testing.

1. Student Response Questionnaire

An attractiveness test was conducted to determine the responses of seventh-grade students at SMP Taman Siswa Teluk Betung, Bandar Lampung,

with a total of 27 participants. Based on the questionnaire results, an average score of 4 was obtained; thus, the interactive learning video on algebra is categorized as "Attractive."

2. Subject Teacher Response Questionnaire

Further testing was conducted through a response questionnaire for seventh-grade mathematics teachers. Based on the results, an average score of 4.9 was obtained, categorizing the interactive learning video as "Practical" for use as a learning medium.

3. *Post-Test* Results

The post-test was used to measure the effectiveness of the interactive learning video. Student learning outcomes showed a mastery achievement of 81.48% with an average score of 85.6. This indicates that the interactive learning video is effective in facilitating the problem-solving skills of seventh-grade students at SMP Taman Siswa Teluk Betung, Bandar Lampung.

The final product developed in this study is an interactive learning video on algebra for seventh-grade students at SMP Taman Siswa Teluk Betung, Bandar Lampung. This product is declared a practical learning medium for teachers and an attractive, user-friendly tool for students. Trial results show that the developed video is effective in improving student learning outcomes, with a classical mastery achievement of 81.48% out of 27 students.

The interactive learning video has been proven valid in terms of material. This validity is evidenced by the attractive visual interface, which enhances student motivation. The video includes illustrations, images, and symbols aligned with the teaching material, presented systematically according to the cognitive level of seventh-grade students. Another advantage is that the video can be replayed anytime and anywhere, facilitating practical and accessible learning via students' devices. This makes the learning process more enjoyable and engaging. In terms of attractiveness, the initial interface creates a positive impression, the design is organized and consistent, and the appropriate use of language and typography supports material comprehension. Consequently, expert validation, student responses, and teacher feedback confirm that this learning video is accessible, engaging, and suitable for the characteristics of seventh-grade students.

Analysis of the material validation results shows that the content and presentation feasibility aspects obtained an average score of 4.6, meeting the "Valid" criteria in accordance with the learning outcomes and objectives of the Kurikulum Merdeka for algebra. The presented material is accurate, supported by clear imagery, terminology, and symbols, and meets the criteria for current relevance in mathematical developments. This interactive learning video also encourages students to discover concepts independently through the problems presented, thereby honing their mathematical problem-solving skills. Each material

is presented consistently with coherence between illustrations and explanations, making it feasible for implementation in mathematics education. The capture of video can be seen in Figure 1.

Figure 1. Initial explanation of the material and language presentation in the learning video

The results of the linguistic assessment of the interactive learning video media indicate that the sentence presentation is clear and easy to understand, thereby assisting students in comprehending the material. The language used is straightforward, featuring a structured, effective, and standardized terminology. Furthermore, the learning video is communicative, dialogic, and interactive, while remaining consistent with linguistic rules. The delivery of the material is also consistent in its use of terms, symbols, and icons. Based on the validation from language experts as well as feedback from teachers and students, the interactive learning video on algebra is declared feasible for use as a learning resource. The example of revision can be seen in Figure 2.

Figure 2. Presentation of the material in the learning video

The study of the final product demonstrates that the developed interactive learning video on algebra is capable of presenting mathematics education that is more engaging, practical, and easily understood by students. Students' comprehension can be accurately measured through the practice exercises provided within the video. Furthermore, the advantage of this media lies in its ability to facilitate learning, create a more interactive learning atmosphere, and foster creativity in problem-solving. Consequently, this media can reduce learning boredom and assist students in grasping the delivered material more effectively. Therefore, the final product of this research is declared feasible for use as a learning medium.

The results of this study align with previous research indicating that interactive video media can enhance student engagement and learning outcomes in mathematics (Arisa & Alfiyah, 2025; Ghifari et al., 2022; Octaviani et al., 2024). The improvement in students' learning outcomes is likely influenced by the visual representation of algebraic concepts and the interactive exercises embedded in the video, which help students connect abstract symbols with concrete examples. These findings support the constructivist learning theory, which emphasizes active student involvement in constructing knowledge through interaction with learning resources.

This study contributes to mathematics education by demonstrating that interactive learning videos can serve as an effective instructional tool for teaching abstract algebra concepts at the junior high school level. The developed media not only supports students' cognitive understanding but also provides practical guidance for teachers in integrating interactive digital media into mathematics instruction.

Conclusion

Based on the research results and discussion, it can be concluded that the interactive learning video on algebra for seventh-grade students at SMP Taman Siswa Teluk Betung, Bandar Lampung, is feasible for use as a learning tool. This is evidenced by the validation results from experts: material experts gave an average score of 4.6, media experts gave an average score of 4.5, and language experts gave an average score of 4.45, all of which fall into the 'Valid' category. Trial results also showed positive responses from both teachers and students. Teachers provided an average score of 4.9 (Practical), while students gave an average score of 4.0 (Attractive). The effectiveness of this media is further confirmed by post-test results, which show a student learning mastery rate of 81.48% with an average score of 85.6. Consequently, the developed interactive learning video is proven to be valid, practical, attractive, and effective in improving mathematics learning outcomes, particularly in algebra material.

Declarations

Author contribution. MR: conceptualization, research design, media development, data collection, data analysis, and writing—original draft; AN: methodology, validation, supervision, data interpretation, and writing—review and editing. FR: instrument development, data analysis support, visualization, and writing—review and editing. All authors have read and approved the final manuscript.

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