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Development of Teaching Materials to Improve Student Learning Outcomes Using Learning Videos for Grade V Elementary School

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Abstract: This research aims to develop video-based mathematics teaching materials for grade V elementary school students, as a solution to low learning outcomes and the use of conventional teaching materials that are less attractive. The development model used is ADDIE, which includes the analysis, design, development, implementation, and evaluation stages. The analysis was carried out by curriculum studies, observations, and interviews with teachers to find out the needs of students. The design stage involves planning materials, video structures, interactive quizzes, and contextual practice questions. Product development is validated by material, media, and language experts using Aiken's V analysis, which indicates all aspects are in the valid category. Implementation is carried out in learning to assess the effectiveness and practicality of teaching materials. The results of the study show that video teaching materials are effective in improving students' understanding of mathematics materials, and are considered practical and interesting by teachers and students. This product is able to present material visually, interactively, and relevant to daily life. Therefore, this video-based teaching material can be an alternative to improve the quality of mathematics learning in grade V of elementary school.

Keywords: ADDIE; Development; Elementary School; Learning Video; Teaching Material

Introduction

Basic education is an important foundation in shaping students' basic competencies, including mastery of mathematical concepts (Ginanjar, 2019; Iasha et al., 2024; Safari & Nurhida, 2024; Witono & Hadi, 2025). Mathematics plays an important role in daily life and develops logical, analytical, and systematic thinking skills (Atmaja, 2024; Jannah & Hayati, 2024; Makhmudah, 2018; Marni & Pasaribu, 2021; Nurhaswinda et al., 2025; Rachmantika & Wardono, 2019; Saputra, 2024). Therefore, mathematics learning in elementary school should be designed to arouse interest and provide a deep understanding of the concepts being taught.

However, learning mathematics in elementary school still faces various challenges. Based on observations at the 08 Arikia State Elementary School on October 9, 2024, most grade V students have difficulty understanding mathematics material, with only 40% of learning outcomes meeting the Learning Goal Achievement Criteria (KKTP). One of the reasons is the use of teaching materials that are still conventional and less interesting.

Ideal teaching materials must meet certain criteria, such as presenting the material systematically and logically, using communicative language, equipped with images or visualizations, and developing critical thinking, collaboration, and problem-solving skills (Subkan & Winarno, 2020). However, the reality is that the teaching materials used are still dominant in the

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form of package books and Student Worksheets (LKPD) which are monotonous, non-interactive, and do not relate the material to daily life.

With technological advances and the Independent Curriculum policy that encourages the use of ICT, the development of mathematics teaching materials using video learning has become a relevant innovative solution. Videos allow for the incorporation of text, image, animation, sound, and interactivity elements, which can help learners understand abstract concepts in a more concrete and engaging way (Ali et al., 2025; Andrasari et al., 2022; Khairani et al., 2024; Melati et al., 2023).

The development of learning videos is expected to provide a more meaningful learning experience, allowing students to understand mathematical concepts more applicatively and relate them to real-life contexts. On the other hand, this video can also help teachers in delivering material in a more systematic and interesting way. It is important to conduct a needs analysis before developing teaching materials. Observations and interviews with teachers and learners can provide valuable insights into challenges in math learning (Halim, 2024; Holst et al., 2020; Musyarrofah & Sahronih, 2025; Novitasari et al., 2023). Once the teaching materials are developed, their validity and effectiveness must be tested systematically. Validation by experts is required to assess the feasibility of the content and the integration of the teaching material components.

A survey of the current state of mathematics learning is an important first step. The data collected will be the basis for designing teaching materials that are appropriate to the classroom conditions. Feedback from teachers and students after the use of teaching materials will be very useful for future refinement (Shah & Oviyanti, 2025; Tantya & Yuniseffendri, 2025).

In conclusion, the development of mathematics teaching materials using learning videos is a strategic step in improving the quality of learning in elementary schools. Through a technology-based and collaborative approach, students are expected to more easily understand mathematical concepts as a whole, which in turn can improve their academic achievement.

Method

The method used in this study is research and development with the ADDIE development model. This research uses the ADDIE model which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. In the Analysis stage, the needs of students and teachers are identified through interviews and classroom observations to understand difficulties in mathematics learning as well as curriculum analysis to ensure the suitability of teaching materials with learning outcomes. The Design stage involves the formulation of specific and measurable learning objectives, as well as the design of teaching materials consisting of introductions, materials, and video-based learning activities. Furthermore, in the Development stage, the teaching materials that have been designed are validated by material experts, media, and teachers, and revised based on the input obtained. At the Implementation stage, the teaching materials were tested on 10 students to evaluate their initial effectiveness, by collecting data through observation, questionnaires, and learning outcome tests. Based on the results of the limited trial, the teaching materials were revised and applied on a larger scale to measure their effectiveness overall. Finally, at the Evaluation stage, the data from the trial was analyzed using quantitative and qualitative methods to evaluate the effectiveness of the teaching materials and obtain feedback from teachers and students, which were then used for final revision. The research subjects were class V students and class V teachers, with the instruments used including validation questionnaires, observation sheets, learning outcome tests, and student response questionnaires.

The data collection techniques in this study include observation, interviews, questionnaires, and tests. Observations were used to see student engagement and response to teaching materials. Interviews with teachers explore information about the use of teaching materials and obstacles in the classroom. Questionnaires are given to experts (materials, media, and teachers) for validation, as well as to students to assess the attractiveness and ease of teaching materials. Pre-test and post-test tests are used to measure improved learning outcomes, analyzed by gain scores and paired t-tests. Data were analyzed quantitatively and qualitatively to assess validity (with Aiken's V), effectiveness (N-Gain and t-test), and practicality of teaching materials based on the percentage of positive responses from students

Result and Discussion

Stages of Analysis

The curriculum analysis was carried out with reference to the Independent Curriculum for grade V of elementary school, which emphasizes competency-based learning and character strengthening. The material includes measurement, geometry, statistics, and numbers, including KPK and FPB. However, the results of observations and interviews show that the existing teaching modules are still general and less contextual, while students have difficulty understanding abstract concepts if they are only

explained orally. Therefore, more interesting, visual, and applicable teaching materials are needed, such as learning videos that can present the material audio-visually and according to the needs of students. Needs analysis reveals that learning still relies on conventional textbooks, which leads to boredom and difficulty in understanding concepts. Grade V students, who are at the concrete operational stage according to Piaget, are more interested in interactive and visual learning that involves exploration and games. Taking these characteristics into account, the development of video-based teaching materials is expected to help them understand mathematical concepts in a concrete and meaningful way, increase active participation, and support diverse learning styles.

Design Stage

At the design stage, the development of multimedia-based teaching materials is focused on designing an initial prototype of a learning video that integrates curriculum needs, student characteristics, and analysis of previous teaching materials to support mathematics learning in grade V of elementary school.

Figure 1. Planning

Figure 2. Instructions for use

Development Stage

At this stage, an initial assessment instrument in the form of a pre-test and post-test is prepared to measure the improvement of student learning outcomes. In addition, a practicality and effectiveness questionnaire was prepared to assess the ease of use and impact of teaching materials on learning. Expert validation was carried out by three experts to assess the feasibility of the material, media, and language, with the results of the analysis using Aiken's V showing that all aspects were in the valid category.

Table 1. Aiken's V Analysis Results

Aspect	Statment	Score	Max Score	Sum	Aiken's V	Category
Material	8	73	80	3	0.92	Valid
Media	7	63	70	3	0.90	Valid
Language	6	53	55	3	0.97	Valid

Based on the results of Aiken's V, the next stage of development is to make minor improvements according to expert suggestions and prepare teaching materials for a limited trial in grade V of elementary school, focusing on improving media displays, increasing interactivity, and strengthening content according to student characteristics and pedagogical rules.

Implementation Stage

Effectiveness of Teaching Materials

The effectiveness of mathematics teaching materials using learning videos was measured through quantitative analysis of pretest and posttest data. The results of the analysis showed a significant increase in the N-Gain score of students, both in small and large groups. In the small group test (11 students), the average N-Gain score was 0.7483 with a standard deviation of 0.04733, which is equivalent to 74.83% (standard deviation of 4.73%), indicating a positive impact on material comprehension.

Table 3. N-Gain Small Group Score

Parameters	N	Min	Max	Mean	Std. Deviation
NGainScore	11	0.67	0.82	0.7483	0.04733
NGainPercentage	11	66.67	82.35	74.8314	4.73315
Valid N (listwise)	11				

In the large group (22 students), the average N-Gain score reached 0.8008 with a standard deviation of 0.05113, equivalent to 80.08% (standard deviation of 5.11%). These results show that teaching materials remain effective and consistent on a wider scale.

Table 4. N-Gain Large Group Score

Parameters	N	Min	Max	Mean	Std. Deviation
NGainSkor	22	0.71	0.88	0.8008	0.05113
NGainPersen	22	70.59	87.50	80.0812	5.11275
Valid N (listwise)	22				

The improvement in learning outcomes in both groups shows that this teaching material is effective in helping students understand mathematical concepts, reflected in active involvement, the ability to answer questions correctly, and increased confidence in solving mathematical problems.

Practicality of Teaching Materials

After the development and validation stage, the implementation stage aims to test the practicality of the mathematics video teaching materials for grade V elementary school through a questionnaire that measures the appearance, ease of use, and comprehension of the material. Teachers rated the teaching materials as interesting, easy to run, and facilitate fun learning, with relevant and easy-to-understand materials, as well as effective evaluations, obtaining a 100% practicality score. Students rated the teaching materials as very practical with a score of 88.57%, felt that the teaching materials were accessible, informative, and relevant. With a score of 1346 out of 1540, this teaching material is considered very practical, improves students' understanding of the material, and shows that the mathematics video teaching material has high practicality and is suitable for use in mathematics learning in elementary schools.

Table 5. Paired T-Test Result

Parameters		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	SmallPreTest – SmallPostTest	-41.091	1.136	.343	-41.854	-40.328	-119.948	10	.000
Pair 2	Big PreTest – Big PostTest	-35.773	.429	.091	-35.963	-35.583	-391.178	21	.000

In Pair 1 (small group), the analysis showed an average difference between the pretest and posttest of -41,091, with a t count of -119,948 and a significance value of 0.000, which showed a significant difference. In Pair 2 (large group), the mean difference was -35.773, with t calculated -391.178 and a significance value of 0.000, also showing a significant difference. Both groups, both small and large, experienced a significant increase in posttest results compared to pretests, which showed that the use of learning video teaching materials was effective in improving mathematics learning outcomes in grade V of elementary school.

Evaluation Stage

The evaluation stage aims to assess the effectiveness, practicality, and feasibility of mathematics video teaching materials. The evaluation was carried out through pretest, posttest, and questionnaire responses from teachers and students. The effectiveness was analyzed with a paired sample t-test, which showed a significant increase (Sig. 2-tailed = 0.000 < 0.05), indicating that the teaching materials were effective in improving students' understanding. Practicality was analyzed from the responses of teachers and students, who gave a very practical score on the measured indicators. Teachers assessed that the teaching materials were easy to use, in accordance with the curriculum, and supported interactive learning. Students feel

enthusiastic and helped by visualizations and animations, which increase interest in learning and understanding of concepts. Overall, this teaching material is suitable for use in grade V of elementary school and can be further developed.

Conclusion

Based on the results of the research, it can be concluded that: (The development of mathematics teaching materials using learning videos follows the ADDIE model, including needs analysis, design, development, implementation of limited trials, and evaluation; Expert validation shows that the teaching material is valid in terms of content, presentation, language, and media display, meeting the Mathematics learning standards for grade V of elementary school; The effectiveness of teaching materials is evidenced by a significant increase in learning outcomes through the paired samples t-test (Sig. < 0.05), showing that teaching materials are effective in improving students' understanding; Teacher and student responses stated that the teaching materials were practical, easy to use, relevant to the curriculum, and made learning more fun and easy to understand.

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The authors declare no conflict of interest.

References

Ali, A., Venica, S. D., Aini, W., & Hidayat, A. F. (2025). Efektivitas media pembelajaran interaktif dalam meningkatkan minat dan motivasi belajar siswa sekolah dasar. *Journal of Information System and Education Development*, *3*(1), 1–6. https://doi.org/10.62386/jised.v3i1.115

Andrasari, A. N., Haryanti, Y. D., & Yanto, A. (2022). Media Pembelajaran Video Animasi Berbasis Kinemaster Bagi Guru Sd. *Prosiding Seminar Nasional Pendidikan*, *4*, 76–83. Retrieved from https://prosiding.unma.ac.id/index.php/semnasfkip/article/view/781

Atmaja, I. M. D. (2024). Logika berpikir manusia dalam konteks etnomatematika dan konsep matematika. *Prosiding Mahasaraswati Seminar Nasional Pendidikan Matematika*, *3*(1), 2–23. Retrieved from https://e-journal.unmas.ac.id/index.php/Prosemnaspmatematika/article/view/8829

Ginanjar, A. Y. (2019). Pentingnya penguasaan konsep matematika dalam pemecahan masalah matematika di SD. *Jurnal Pendidikan UNIGA*, *13*(1), 121–129. https://doi.org/10.52434/jp.v13i1.822

Halim, R. A. (2024). Analisis Hambatan dan Tantangan Guru dalam Mengimplementasikan Kurikulum Merdeka pada Pembelajaran Matematika di MTs 3 Tidore. *Juanga: Jurnal Agama Dan Ilmu Pengetahuan*, *10*(2). https://doi.org/10.59115/juanga.v9i0

Holst, J., Brock, A., Singer-Brodowski, M., & Haan, G. (2020). Monitoring progress of change: Implementation of Education for Sustainable Development (ESD) within documents of the German education system. *Sustainability (Switzerland)*, *12*(10). https://doi.org/10.3390/su12104306

Iasha, V., Zulfah, M., Amelia, M., Dari, Y. W., Ayu, D. S., Halimatussadiah, H., Jamilah, S., Mahendra, D. A., Salsabila, N. E., & Setiawan, B. (2024). Pentingnya Literasi Numerasi sebagai Fondasi Pendidikan Sekolah Dasar untuk Membangun Kecerdasan dan Kemandirian Siswa di Masa Depan. *Action Research Journal Indonesia (ARJI*, *6*(4), 581–600. https://doi.org/10.61227/arji.v6i4.279

Jannah, M., & Hayati, M. (2024). Pentingnya kemampuan literasi matematika dalam pembelajaran matematika. *Griya Journal of Mathematics Education and Application*, *4*(1), 40–54. Retrieved from https://shorturl.asia/v8H04

Khairani, M., Saskiawati, E., & Farhurohman, O. (2024). Dampak Konten Vidio Animasi pada Peningkatan Pemahaman Siswa terhadap Pembelajaran IPS yang Terintegrasi di Pendidikan Dasar. *CENDEKIA: Jurnal Ilmu Sosial, Bahasa Dan Pendidikan*, *4*(4), 268–279. https://doi.org/10.55606/cendikia.v4i4.3317

Makhmudah, S. (2018). Analisis literasi matematika terhadap kemampuan berpikir kritis matematika dan pendidikan karakter mandiri. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 318–325. Retrieved from

https://journal.unnes.ac.id/sju/prisma/article/view/20125

Marni, M., & Pasaribu, L. H. (2021). Peningkatkan kemampuan berpikir kreatif dan kemandirian siswa melalui pembelajaran matematika realistik. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5*(2), 1902–1910. https://doi.org/10.31004/cendekia.v5i2.621

Melati, E., Dara Fayola, A., Putu Agus Dharma Hita, I., Muh Akbar Saputra, A., & Ninasari, A. (2023). Pemanfaatan Animasi sebagai Media Pembelajaran Berbasis Teknologi untuk Meningkatkan Motivasi Belajar. *Journal on Education*, *06*(01), 732–741. https://doi.org/10.31004/joe.v6i1.2988

Musyarrofah, S., & Sahronih, S. (2025). The Influence of Students' Self-Confidence on Mathematical Problem-Solving Abilities in Grade V of Elementary School. *Prima Development of Education*, *1*(1), 11–20. Retrieved from https://pride.ipbcirebon.ac.id/index.php/pride/article/view/5

Novitasari, A., Ramadhania, F., Maulana, F., & Nadhif, W. N. (2023). Inovasi Pembelajaran Mapel Matematika Dalam Kurikulum Merdeka Di MIN Kedungwuni. *Jurnal Pendidikan, Bahasa Dan Budaya*, *2*(2), 178–188. https://doi.org/10.55606/jpbb.v2i2.1513

Nurhaswinda, N., Rahman, A., Mahdi, M., Zahara, J., & Isamadola, I. (2025). Peran logika matematika dalam pemecahan masalah sehari-hari. *Cahaya Pelita: Jurnal Pendidikan Dan Kebudayaan*, *1*(2), 56–60. Retrieved from https://shorturl.asia/GXxMe

Rachmantika, A. R., & Wardono, W. (2019). Peran Kemampuan Berpikir Kritis Siswa pada Pembelajaran Matematika dengan Pemecahan Masalah. *PRISMA, Prosiding Seminar Nasional Matematika*, *2*, 439–443. Retrieved from https://journal.unnes.ac.id/sju/prisma/article/view/29029

Safari, Y., & Nurhida, P. (2024). Pentingnya Pemahaman Konsep Dasar Matematika dalam Pembelajaran Matematika. *Karimah Tauhid*, *3*(9), 9817–9824. Retrieved from https://ojs.unida.info/karimahtauhid/article/view/14625

Saputra, H. (2024). Perkembangan berpikir matematis pada anak usia sekolah dasar. *JEMARI (Jurnal Edukasi Madrasah Ibtidaiyah)*, *6*(2), 53–64. Retrieved from https://journal.unuha.ac.id/index.php/jemari/article/view/3311

Shah, K., & Oviyanti, F. (2025). Analisis Proses Pembelajaran Pendidikan Agama Islam Berbasis Keterampilan Kolaborasi Pada Peserta Didik di Sekolah Menengah Pertama. *Didaktika: Jurnal Kependidikan*, *14*(2 Mei), 2761–2774. https://doi.org/10.58230/27454312.2274

Subkan, A., & Winarno, W. (2020). Pengembangan Media Pembelajaran Matematika melalui Aplikasi Powtoon di Madrasah Ibtidaiyah (MI) Miftahut Thulab Brambang Karangawen. *JIP Jurnal Ilmiah PGMI*, *6*(2), 178–194. https://doi.org/10.19109/jip.v6i2.6129

Tantya, N. G., & Yuniseffendri, Y. (2025). Pengembangan Bahan Ajar Berbasis Kearifan Lokal Sedekah Bumi Menggunakan Model Addie Pada Materi Teks Cerita Pendek Untuk Siswa Kelas XI. *Bapala*, *12*(1), 187–201. Retrieved from https://ejournal.unesa.ac.id/index.php/bapala/article/view/65950

Witono, S., & Hadi, M. S. (2025). Numerasi dan kemampuan berpikir kreatif pada pembelajaran matematika di sekolah dasar. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, *8*(3), 2489–2496. https://doi.org/10.54371/jiip.v8i3.7180