Journal of Educational Sciences
Journal homepage: https://jes.ejournal.unri.ac.id/index.php/JES
P-ISSN 2581-1657
E-ISSN 2581-2203

Development of Interactive Multimedia-Based IPAS Learning Media to Improve Learning Outcomes and Critical Thinking Skills of Fifth Grade Elementary School Students

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ARTICLE INFO

Article history:

Received: 06 Nov 2025
Revised: 16 Nov 2025
Accepted: 06 Dec 2025
Published online: 08 Dec 2025

Keywords:

Media Development,
Interactive Multimedia,
IPAS,
Learning Outcomes,
Critical Thinking

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Article Doi:

https://doi.org/10.31258/jes.9.6.p.6311-6323

A B S T R A C T

This study aims to develop interactive multimedia–based IPAS learning media designed to enhance learning outcomes and critical thinking skills of fifth-grade elementary school students. The initiative responds to the demands of the Industrial Revolution 4.0 and Society 5.0, which require technology-integrated learning, particularly for teaching abstract concepts such as food chain material. Using a Research and Development (R&D) approach, the study employed the ADDIE model. Analysis, Design, Development, Implementation, and Evaluation—combined with Tessmer's formative evaluation, including one-to-one, small-group, and field test stages. Data were collected through observations, interviews, and questionnaires involving experts, teachers, and students. The findings indicate that the developed multimedia meets the criteria of validity, practicality, and effectiveness, as evidenced by expert validation results and positive user responses. Statistical testing also showed a significant improvement in student learning outcomes after using the media. Moreover, students' critical thinking skills increased, particularly in identifying problems, analyzing information, drawing conclusions, and proposing solutions. Overall, the interactive multimedia–based IPAS learning media is feasible and effective as an innovative learning resource that supports meaningful and technology-oriented learning in elementary schools.

1. Introduction

The era of the Industrial Revolution 4.0 and Society 5.0 has had a major impact on education, particularly on the need to apply technology and learning innovations (Latief, 2020). These changes require learning methods that are adaptive to digital developments, especially at the elementary school level in Natural and Social Sciences (IPAS) subjects, which often contain abstract concepts (Maisarah et al., 2023). In this case, the use of interactive multimedia is a relevant solution because

it can help students understand the material through visualization, audio, animation, and engaging interactivity (Barus & Wati, 2025a).

In line with the principles of the Merdeka Curriculum, multimedia-based learning supports flexibility, diversity of methods, and focuses on student needs (Ashshiddiqi et al., 2024). Sari et al.(2019) emphasizes that multimedia strengthens understanding through visual means, while Agustin et al. (2022) proves that interactive media can increase student interest and participation. Therefore, analyzing the needs for this learning media is crucial to ensure its effectiveness and relevance in addressing the challenges of IPAS learning. The Merdeka Curriculum also emphasizes the importance of meaningful contextual learning, fostering the Pancasila learner profile with eight dimensions of competence, one of which is critical thinking skills (Farhan et al., 2023). In this context, the validity of learning media is essential to ensure that it meets academic standards while attracting students' attention. Validity includes aspects of visual design, audio, animation, and suitability for learning objectives (Annisa & Heryanto, 2023; Asyri et al., 2024; Utomo, 2023)

Previous studies have shown that interactive multimedia can increase student engagement in elementary school classrooms. Dewi & Eliza (2021) asserts that the visual, audio, and kinesthetic elements in multimedia help overcome the challenges of understanding abstract material and improve student memory. This is very important in IPAS, which is full of complex concepts, because multimedia can bridge the gap in understanding and encourage competency-oriented learning. This study focuses on the development of interactive multimedia-based IPAS learning media for fifth-grade elementary school students, unlike previous studies that tended to be limited to specific aspects. For example, Setyawati et al. (2024) study focused on the life cycle of animals, while Laura & Sujana (2022) only developed Indonesian language animated videos without assessing their practicality. This study offers a more comprehensive approach by assessing the validity, practicality, and effectiveness of the media simultaneously.

An evaluation of the use of interactive media at SDN 36 Rantau Bayur showed an increase in student active participation and critical thinking skills (Akbar et al., 2024). Interactive multimedia has also been proven to increase motivation and initiative and provide a more varied learning experience (Barus & Wati, 2025). Thus, this media is relevant to address the challenges of IPAS learning and prepare 21st-century competencies. However, implementation challenges remain, such as limited technological facilities in elementary schools (Prawiladilaga, 2021). Therefore, learning media must be adaptive to various conditions in the field. One of the most widely used applications is Articulate Storyline, which combines text, animation, video, simulation, and interactive elements to create a more engaging learning experience (Rianto, 2020).

The role of teachers in the use of interactive multimedia is very important. They are tasked with managing internal factors (motivation, interest, intellectual ability of students) and external factors (learning environment, facilities, teaching methods) that influence learning outcomes (Syahputra & Maksum, 2020). In IPAS, the

multimedia approach strengthens understanding of science (observation, analysis of natural phenomena) and social studies (understanding of culture, society, and social interaction), enabling students to integrate natural and social aspects (Hakim, 2020; Wulandari et al., 2022). IPAS aims to build students' critical thinking, communication, and collaboration skills. With the help of interactive multimedia such as Articulate Storyline, learning becomes more systematic, interesting, and in line with the needs of the digital age (Eprilia et al., 2023). The integration of technology not only enhances the learning experience but also helps visualize complex concepts, encourages creativity, and equips students with digital skills (Aini & Santosa, 2023; Mambu et al., 2023).

To overcome this, schools and teachers need to provide learning media that is contextual, interesting, and relevant to digital developments. Interactive multimedia such as Articulate Storyline addresses this challenge by combining various elements to create learning that is more flexible, dynamic, and inclusive. This technology is able to reach students from various backgrounds, facilitate the understanding of IPAS, and increase participation and motivation to learn (Agustin et al., 2022; Asyri et al., 2024; Setyawati et al., 2024).

Thus, this study is expected to produce valid, practical, and effective interactive multimedia-based IPAS learning media, as well as become a best practice in improving the quality of basic education in the digital era. This media not only facilitates the understanding of IPAS concepts but also supports the formation of 21st-century skills needed by students to face global challenges.

2. Methodology

This study uses the Research and Development (R&D) method with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. This model was chosen because it is suitable for developing learning media that has been tested for validity, practicality, and effectiveness. This study uses a Research and Development (R&D) approach by combining the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) and the Tessmer model (Formative Evaluation) to produce interactive multimedia-based IPAS learning media that is valid, practical, and effective in improving learning outcomes and critical thinking skills of fifth-grade elementary school students. The research was conducted at SDN 36 Rantau Bayur with 30 fifth-grade students as research subjects. Science teachers were also involved as validators to assess the content, design, and usability of the learning media. The analysis stage included identifying needs, analyzing the science curriculum, the characteristics of the students' learning needs ( ), and the learning context to formulate the basis for media development (Silvia, 2019). Furthermore, in the design stage, the researchers compiled an instructional design, determined learning strategies, prepared IPAS materials, and developed storyboards and media interaction flows to produce an initial prototype. The development stage was carried out by creating products using multimedia software, which were then validated by media experts, design experts, and material experts

to ensure the quality of the content, appearance, and technical aspects of the product.

The implementation and evaluation processes are integrated with the prototyping stage according to Tessmer, which consists of expert review, one-to-one, small group, and field tests. In the expert review stage, three experts assess the feasibility of the product and provide recommendations for revision. in the one-to-one stage, the media is tested on three students with high, medium, and l ow abilities to test its practicality and comprehensibility; the small group stage involves nine students to test its functionality and initial effectiveness; while field tests are conducted on a broader scale at SDN 36 Rantau Bayur to assess the impact of the media on learning outcomes and critical thinking skills. This study also applied a mixed methods approach with a quantitative approach through a pre-experimental design (one-group pretest-posttest design) to measure the increase in learning outcomes after using the media (Sugiyono, 2020), as well as a qualitative approach to explore the experiences and perceptions of teachers and students regarding the use of media (Agustina Puspa Mentari, 2024).

Data collection techniques included observation, in-depth interviews, questionnaires, and focus group discussions (Bungin, 2021), while data analysis was conducted quantitatively using t-tests to compare pretest and posttest scores, and qualitative analysis was conducted thematically to explore the meaning behind the numerical data. The integration of the two approaches was carried out through triangulation to obtain a holistic understanding of the effectiveness of media (Santoso, 2022). The use of a combination of the ADDIE–Tessmer model and this mixed approach not only increased the validity and reliability of the research results but also provided evidence-based recommendations that are applicable for the development of IPAS learning media innovations in elementary schools. Table 1 below shows the data analysis plan for this study.

Table 1 Data Analysis Plan

Variable	Data Type	Statistical Test Design	Instruments
Learning Outcomes	Quantitative (ratio)	t-test (independent samples) / Mann-Whitney	Objective pretest and posttest
Critical Thinking Skills	Quantitative (interval)	t-test (independent samples) / Mann-Whitney	Observation rubric

Next, design a research table using *mixed-methods* to test the effectiveness of developing interactive multimedia-based IPAS learning media, using pretest and post-test. This table includes quantitative data analysis formulas and qualitative data analysis approaches, which can be seen in Table 2.

Table 2. Research Design

No	Research Phase	Activities	Data Method	Data Collection Instruments	Data Analysis
1	Pre-test	Measuring students' prior knowledge	Quantitative	Written test	Descriptive statistical analysis, t-test for independent samples
2	Implementation	Application of interactive multimedia learning media	Qualitative	Observation, Interview	Content analysis, thematic coding
3	Post-test	Measuring students' final knowledge	Quantitative	Written test	Descriptive statistical analysis, t-test for paired samples
4	Evaluation	Overall Program Evaluation	Qualitative	FGD (Focus Group Discussion), Interviews	Content Analysis, Thematic Coding

Source: Processed by researchers, 2024

3. Results and Discussion

Result

The results of this study indicate that the development of interactive multimedia-based IPAS learning media designed through the ADDIE stages and combined with the Tessmer model successfully meets the criteria of validity, practicality, and effectiveness. Based on the needs analysis stage, a high urgency was found for media capable of visualizing the abstract concept of the food chain interactively. At the design stage, the design was carried out systematically by compiling learning objectives in accordance with the achievements of IPAS phase C of the Merdeka Curriculum, compiling contextual visual-animative content, and designing navigation and storyboards using the *Articulate Storyline* platform. Expert validation results showed that the media met curriculum standards, language appropriateness, and the integration of visual, audio, and interactive elements. Design experts rated the appearance as attractive and child-friendly, while subject matter experts rated the media content as accurate and appropriate for elementary school students' development. The *one-to-one* stage showed that students responded very positively to the appearance, ease of navigation, and clarity of sound, although there was minor feedback on the difficulty level of the quiz. The *small group* test reinforced these results, with nine students rating the media as "interesting, easy to use , and fun," with enthusiastic comments such as "bright colors," "cool animations," and "exciting quizzes." In *the field test* involving 52 students from classes V.a and V.b and 5 teachers, *the pretest–posttest* results showed a significant increase from a score range of 10–60 to 76–100. All students (100%) experienced an increase in learning outcomes and responded "strongly agree" to the aspects of

ease, usefulness, and enjoyment of learning using the media. Teachers stated that the media was able to foster motivation, increase focus on learning, and strengthen understanding of the food chain concept through a visual and interactive approach. Based on the results of the Likert and Guttman questionnaires, this media was not only effective in improving cognitive learning outcomes but also encouraged students' critical thinking skills through exploratory and reflective activities during learning. Thus, this interactive multimedia-based IPAS learning media was proven to be valid in terms of content and technical aspects, practical for use in a basic classroom context, and effective in improving student learning outcomes and motivation in comprehensively understanding the concepts of ecosystems and food chains. The first stage was analysis. In this stage, a series of activities were carried out, namely analyzing the need for learning media by conducting a questionnaire using the Likert scale, Gutman scale, and open interviews with students and teachers regarding the need for IPAS learning media to be developed into interactive multimedia-based IPAS learning media. The average score of the needs analysis can be seen in Figure 1 below.

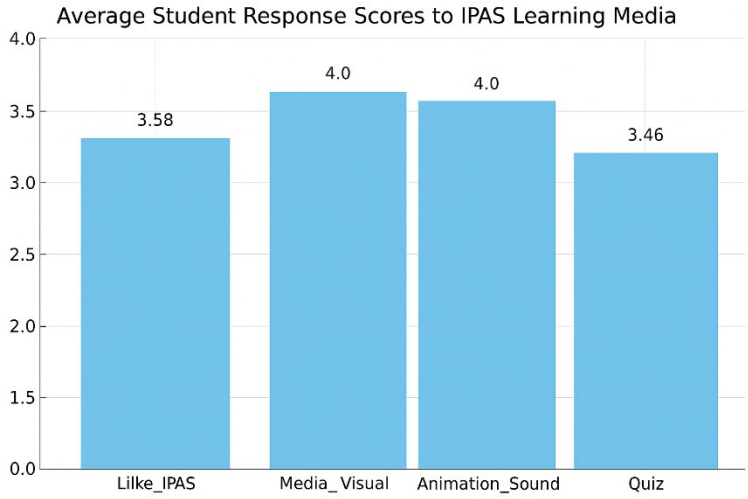

Figure 1. Results of Needs Analysis

Meanwhile, the student needs analysis can be seen in Table 3 below. Gutman Data Diagram of Interactive Multimedia Needs by Class Teachers

Table 3. Results of Teacher Needs Analysis

Question	"Yes" Answer	Answer "No"
Have you ever used interactive media?	2	3
Have you ever created your own media?	4	1
School provides ICT facilities (LCD/laptops)	5	0
Willing to Use Interactive IPAS Media	5	0

Source: Processed by researchers, 2025

After the analysis was conducted, a high need for interactive multimedia-based IPAS learning media was identified. The next step is the design phase, which

includes instructional design and media interface design. This process involves determining the learning strategies to be used, developing Food Chain materials, and creating IPAS learning media using interactive multimedia on the Storyline platform. Then comes the development phase. At this stage, the researcher developed IPAS learning media using interactive multimedia software, which was then validated by media/content experts, subject matter experts, and design experts to produce valid interactive multimedia-based IPAS learning media products. The results of the development can be seen in Figure 2 below.

Figure 2. Interactive Multimedia-Based IPAS Learning Media
https://ariardiansyah.web.id/media/mediarantaimakanan/

After development, the next stage is evaluation. At this stage, the combination of tesmer theory plays a full role, where tesmer theory is referred to in the prototyping stage, which is divided into three parts, namely the first prototype (expert review and one-to-one), the second prototype (small group), and the third prototype (field test). The questionnaire results showed that all students responded strongly in favor of the four aspects, indicating that the media is not only easy to use but also enjoyable, aids understanding, and has the potential to be used continuously in other learning activities. Based on the Guttman scale questionnaire data, this questionnaire was used to measure students' perceptions of attention, understanding of material, and sustained interest in the media. The statements consisted of four items with yes or no answer choices. The results show that all students answered "Yes" to all statements: the media attracted students' attention, students enjoyed learning IPAS using the media, the media helped them understand food chain material, and students wanted to learn IPAS with similar media in the future. These findings reinforce that the interactive multimedia-based IPAS learning media developed is practical and effective in motivating students in learning.

The results of the development of interactive multimedia-based IPAS learning media can improve student learning outcomes, as seen from the pretest and posttest results given to students. The trial was conducted on 52 students consisting of 27 students from class V.a and 25 students from class V.b. The test was conducted to measure the cognitive aspects of students in understanding IPAS material. Before learning using interactive media, students first took a pretest with questions that were filled out manually on paper. After using the developed interactive multimedia-based IPAS learning media, students filled out a post-test quiz in the media with the same questions as in the initial pretest. Based on the recapitulation of the results, it shows that all students experienced an increase in scores, both from the low to medium category and from medium to high. For example, a student named Anugrah (V.a) scored 20 on the pretest and increased to 76.19 on the posttest. In addition, most students, such as Aditia, Aisya Sabila, Aura Kasih from class (V.a) and Kayra Naomi, Maura Oktaviani and Raya Safitri from class (V.b) experienced an increase in scores from 40 to 100. Only a few students did not achieve perfect scores on the posttest but still showed a significant increase from the beginning, for example, Alfan from class (V.a) from a score of 40 to 76.19 and Pando Saputra from class (V.b) from a score of 20 to 76.19. The results can be seen in Figure 3 below.

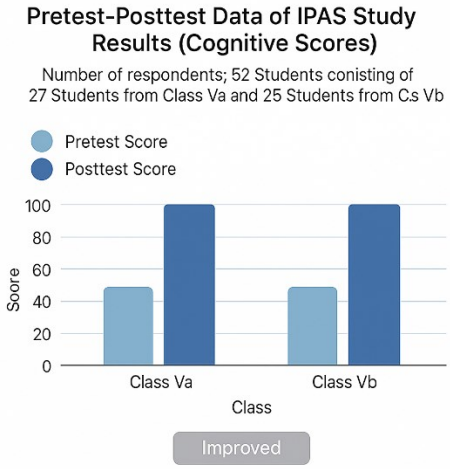

Figure 3. Pretest and Posttest Results

Overall, the graph comparing the average pretest and posttest scores shown in the figure indicates that the average pretest score for class Va was , around 43, while the average posttest score reached 95-100. The average pretest score for class Vb was also around 43 and increased to 95-100 in the posttest. This critical thinking observation was conducted on 52 students from classes Va and Vb who had participated in learning using interactive multimedia-based IPAS learning media. The aspects observed included the students' ability to identify problems, analyze information, draw conclusions, and provide solutions, each with a score of 20 points for a total maximum score of 80 points.

Based on the observation rubric, the results obtained in the field showed that students in class V.a and class V.b were dominated by the categories of Good to Very Good,

with only a few students scoring Fair and no students scoring Poor. These results show that interactive multimedia-based IPAS learning media can encourage and improve the development of students' critical thinking skills, where in the food chain material, students are able to conclude and provide solutions to the problems given in the learning process. From the pretest and posttest data, descriptive statistics can be seen in Table 4 as follows:

Table 4. Descriptive Statistics of Students' Critical Thinking

Statistics	Pre-test	Posttest	N-Gain
Number of Students	52	52	52
Average	44.13	72.79	0.81
Standard Deviation	12.98	13.37	0.34
minimum	25	30	0.00
Maximum	60	80	1.00
Median	45	80	1.00

The pretest mean score was 44.13 (sufficient-poor category), while the posttest mean score was 72.79 (good-very good category), resulting in an N-Gain mean of 0.081, which falls into the high category (Hake, 1998). The results of the Paired sample t-test obtained a t-value of 13.25 and a p-value of 3.86×10^{-18} (much smaller than 0.05), indicating a significant difference between the pretest and posttest scores. Thus, the use of the developed interactive multimedia-based IPAS learning media had a significant effect on improving students' critical thinking skills.

Discussion

The findings of this study demonstrate that the development of interactive multimedia–based IPAS learning media through the ADDIE stages combined with the Tessmer model successfully met the criteria of validity, practicality, and effectiveness. These results are in line with Dewi & Eliza, 2021 and Maulana et al (2022), who assert that interactive multimedia can clarify abstract concepts through the integration of visual, audio, and animated elements, thereby enhancing students' cognitive engagement. The high urgency identified in the needs analysis stage for visual–animative media on food chain material supports Agustin et al. (2022) who found that ecosystem concepts often lead to misconceptions when delivered through conventional methods. At the design stage, the formulation of learning objectives aligned with Phase C competencies and the use of structured storyboards on Articulate Storyline are consistent with Ayu (2022) research-based design principles, which emphasize alignment among objectives, content, and interactive elements in digital learning environments.

The expert validation confirming the appropriateness of content, language, and design further supports Makfiroh & Wulandari (2024), who highlight that collaboration among content, media, and design experts significantly improves both pedagogical and technical quality. Additionally, the positive responses found during the one-to-one and small-group evaluations echo Gunansyah et al. (2021), who reported that bright colors, simple navigation, and dynamic animations

substantially increase young learners' motivation when using interactive learning tools.

The significant improvement in student achievement—from a pretest range of 10–60 to posttest scores of 76–100—reinforces previous findings by (atricia & Zamzam (2021), which showed that interactive multimedia can enhance scientific concept comprehension through exploratory learning experiences. The media's positive impact on students' critical thinking skills is consistent with Walter (2024), who found that interactive, problem-oriented multimedia supports students in identifying problems, analyzing information, and drawing logical conclusions. The high N-Gain value (0.81) and the statistically significant paired t-test results further confirm the effectiveness of the developed media, aligning with Hake's (1998) findings and recent studies such as Al-Shehri (2020), which emphasize that interactivity and real-time feedback within digital learning tools strongly contribute to improved learning outcomes and higher-order thinking skills.

Moreover, increased motivation, focused engagement, and sustained interest reported by students and teachers support the work of Pursitasari et al. (2023), who conclude that interactive multimedia fosters enjoyable learning environments and deepens understanding of ecological concepts. Overall, these findings affirm that the developed interactive multimedia–based IPAS learning media is a pedagogically effective solution for improving learning outcomes, motivation, and critical thinking skills in mastering food chain and ecosystem concepts.

4. Conclusion

Research on the development of interactive multimedia-based IPAS learning media using the ADDIE and Tessmer models shows that the resulting media is valid, practical, and effective. This media contains IPAS material in visual, audio, and interactive forms, making it attractive and easy to use. The results of expert validation and the responses of teachers and students show that the media is suitable for use because it is attractive, the content is in line with the curriculum, and the interactive features support active learning. A significant improvement in student learning outcomes and critical thinking skills was proven through a pretest-posttest, making this media effective in creating enjoyable and motivating learning.

References

Agustin, A. D., Z, F. N., & Wahyudi, W. (2022). Pengembangan Multimedia Interaktif Pada Materi Hubungan Antar Komponen Ekosistem Dan Jaring-Jaring Makanan Di Lingkungan Sekitar Pada Siswa Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(3), 3326–3332. Https://Doi.Org/10.31004/Edukatif.V4i3.2248

Aini, A. N., & Santosa, K. (2023). *Perancangan Sistem Perpustakaan Digital Berbasis Web Pada Mts Daarul Muqimien Menggunakan Extreme Programming (Prototype)*. *2*(5).

Akbar, I., Saputro, S., & Masykuri, M. (2024). *Critical Thinking In Science Learning Research Tren From 2014-2024: A Systematic Literature Review*. *10*(12).

Al-Shehri, M. S. (2020). Effect Of Differentiated Instruction On The Achievement And Development Of Critical Thinking Skills Among Sixth-Grade Science Students. *International Journal Of Learning, Teaching And Educational Research*, *19*(10), 77–99. Https://Doi.Org/10.26803/Ijlter.19.10.5

Annisa, S., & Heryanto, A. (2023). *Pengembangan Media Digital Pada Pembelajaran Bahasa Indonesia Untuk Siswa Kelas V Sd*. *08*.

Ashshiddiqi, M. H., Mayesti, N., & Irawati, I. (2024). *Pemanfaatan Ai Dalam Era Kurikulum Merdeka: Perspektif Siswa Dan Guru Sekolah Menengah*. *12*(1).

Asyri, D., Habibi, Mhmd., Aramudin, A., & Sopia, S. (2024). Pengembangan Media Pembelajaran Game Interaktif Ipa Menggunakan Canva Terintegrasi Hots Di Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, *6*(4), 3431–3439. Https://Doi.Org/10.31004/Edukatif.V6i4.7333

Ayu, R. R. (2022). The Need Analysis Of The Development Of Animation Video-Based Learning Media On Physics Education Students. *Asian Journal Of Healthy And Science*, *1*(2), 45–49. Https://Doi.Org/10.58631/Ajhs.V1i2.10

Barus, Y., & Wati, D. S. (2025a). *Development Of Interactive Multimedia On The Process Of Hindu-Buddhist Religion And Culture In Indonesia At Sma Negeri 1 Lubuk Keliat*. *10*(1).

Barus, Y., & Wati, D. S. (2025b). *Development Of Interactive Multimedia On The Process Of Hindu-Buddhist Religion And Culture In Indonesia At Sma Negeri 1 Lubuk Keliat*. *10*(1).

Dewi, R. A., & Eliza, D. (2021). Analisis Kemampuan Bahasa Pada Anak Usia Dini Melalui Penggunaan Media Audio Visual. *Jiip - Jurnal Ilmiah Ilmu Pendidikan*, *4*(8), 809–814. Https://Doi.Org/10.54371/Jiip.V4i8.351

Eprilia, W., Raharjo, M., & Nurhasan, N. (2023). Analisis Kebutuhan Model Pbl Berbasis Video Boneka Interaktif Pada Materi Zakat Di Sekolah Dasar. *Dharmas Education Journal (De_Journal)*, *4*(2), 659–668. Https://Doi.Org/10.56667/Dejournal.V4i2.1140

Farhan, A., Alfiah, N., Furqon, A., & Noor, A. M. (2023). *Implementasi Kurikulum Merdeka Belajar Pada Mata Pelajaran Informatika/Tik Di Smp Al Manshuriyah Pemalang*. *13*.

Gunansyah, G., Zuhdi, U., Suprayitno, S., & Aisy, M. R. (2021). Sustainable Development Education Practices In Elementary Schools. *Journal Of Education And Learning (Edulearn)*, *15*(2), 178–187. Https://Doi.Org/10.11591/Edulearn.V15i2.17091

Hakim, M. L. (2020). The Development Of Interactive Learning Multimedia For Zakat Lesson. *Edukasia : Jurnal Penelitian Pendidikan Islam*, *15*(1), 79. Https://Doi.Org/10.21043/Edukasia.V15i1.7251

Latief, S. (2020). Pendidikan Anak Usia Dini (Paud) Sebagai Pondasi Pembentukan Karakter Dalam Era Revolusi 4.0 Dan Society 5.0: Teknik Dan Keberlanjutan Pendidikan Karakter. *Jurnal Literasiologi*, *3*(2). Https://Doi.Org/10.47783/Literasiologi.V3i2.92

Laura, S. D., & Sujana, I. W. (2022). Video Interaktif Berbasis Problem Solving Sebagai Media Pembelajaran Unik Bagi Siswa Kelas Iv Sekolah Dasar.

Jurnal Ilmiah Pendidikan Profesi Guru, *5*(1), 96–101. Https://Doi.Org/10.23887/Jippg.V5i1.46600.

Maisarah, M., Maolida, N., & Prasetya, C. (2023). Pengembangan Media Video Pembelajaran Berbasis Canva Pada Pelajaran Ipas Kelas Iv Sekolah Dasar. *Trapsila: Jurnal Pendidikan Dasar*, *5*(1), 44. Https://Doi.Org/10.30742/Tpd.V5i1.2932

Makfiroh, A., & Wulandari, F. E. (2024). *The Effect Of Science Learning Assisted By Tiktok Media On Learning Outcomes Of Junior High School Students: Pengaruh Pembelajaran Ipa Berbantuan Media Tiktok Terhadap Hasil Belajar Siswa Smp*. Https://Doi.Org/10.21070/Ups.4060

Mambu, J. G. Z., Pitra, D. H., Ilmi, A. R. M., Nugroho, W., & Saputra, A. M. A. (2023). *Pemanfaatan Teknologi Artificial Intelligence (Ai) Dalam Menghadapi Tantangan Mengajar Guru Di Era Digital*. *06*(01).

Maulana, Z. I., Fadhilawati, D., & Fauzi, A. (2022). *Developing Hand Puppet Video As Media For Teaching And Learning Speaking In Senior High School*. *12*(2).

Patricia, F. A., & Zamzam, K. F. (2021). Development Of Scientific Approach-Based Interactive Multimedia For Elementary School Dyscalculia Children. *Jurnal Prima Edukasia*, *9*(1). Https://Doi.Org/10.21831/Jpe.V9i1.33853

Prawiladilaga, D. S. (2021). *Wawasan Teknologi Pendidikan*. Kencana.

Pursitasari, I. D., Rubini, B., Suriansyah, M. I., Samsia, S., & Puspita, N. (2023). Climate Change Interactive Teaching Materials To Enhance Students' Critical Thinking Skills And Science Attitude. *Jurnal Penelitian Pendidikan Ipa*, *9*(3), 1360–1367. Https://Doi.Org/10.29303/Jppipa.V9i3.3196

Rianto, R. (2020). Pembelajaran Interaktif Berbasis Articulate Storyline 3. *Indonesian Language Education And Literature*, *6*(1), 84. Https://Doi.Org/10.24235/Ileal.V6i1.7225

Sari, D., Susanti, R., & Khodijah, N. (2019). *Pengembangan Multimedia Interaktif Materi Sistem Ekskresi Untuk Siswa Sma*. *8*.

Setyawati, D. R., Sephiawardhani, N. A., & Fauziyyah, Z. (2024). *Peningkatan Hasil Belajar Ipas Pada Materi Jaring-Jaring Makanan Melalui Media Pembelajaran Diorama Pada Peserta Didik Kelas Vb Sd Negeri Cengklik Surakarta Tahun Ajaran 2024/2025*.

Syahputra, F., & Maksum, H. (2020). The Development Of Interactive Multimedia Learning In Information And Communication Technology Subjects. *Journal Of Education Research And Evaluation*, *4*(4), 428. Https://Doi.Org/10.23887/Jere.V4i4.29931

Utomo, F. T. S. (2023). Inovasi Media Pembelajaran Interaktif Untuk Meningkatkan Efektivitas Pembelajaran Era Digital Di Sekolah Dasar. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, *8*(2), 3635–3645. Https://Doi.Org/10.23969/Jp.V8i2.10066

Walter, Y. (2024). Embracing The Future Of Artificial Intelligence In The Classroom: The Relevance Of Ai Literacy, Prompt Engineering, And Critical Thinking In Modern Education. *International Journal Of Educational Technology In Higher Education*, *21*(1), 15. Https://Doi.Org/10.1186/S41239-024-00448-3

Wulandari, S. S., Puspasari, D., Puspasari, D., Aeni, R. N., & Puspitasari, R. O. (2022). *Development Of Interactive Multimedia-Based Teaching Materials For Distance Learning During The Covid-19 Pandemic*. *32*.

How to cite this article:

Yunita, R., Effendi., & Firmansyah, J. (2025). Development of Interactive Multimedia-Based IPAS Learning Media to Improve Learning Outcomes and Critical Thinking Skills of Fifth Grade Elementary School Students. *Journal of Educational Sciences*, *9(6)*, 6311-6323.