



Whiteboard Animation Learning Media on Economic Activity Material for Grade IV Elementary Schools

Naufal Aziz Fadhlurrohman^{1*}, Kurniana Bektiningsih² 

^{1,2} Pendidikan Guru Sekolah Dasar, Universitas Negeri Semarang, Semarang, Indonesia

ARTICLE INFO

Article history:

Received November 26, 2023

Accepted March 10, 2024

Available Online April 25, 2024

Kata Kunci:

Media Pembelajaran, Whiteboard Animation, Ilmu Pengetahuan Alam dan Sosial

Keywords:

Whiteboard Animation, Learning Media, Natural and Social Sciences



This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

Copyright © 2024 by Author. Published by Universitas Pendidikan Ganesha.

ABSTRAK

Berdasarkan dari hasil observasi yang dilakukan oleh peneliti di kelas IV sekolah dasar membuktikan bahwa terdapat permasalahan dalam proses pembelajaran, kurangnya jenis maupun macam media pembelajaran yang digunakan salah satunya pada muatan pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS). Alasan peneliti melakukan penelitian ini untuk mengembangkan media pembelajaran dengan kreatif serta inovatif untuk menumbuhkan minat belajar peserta didik lebih tinggi. Penelitian ini bertujuan dalam mengembangkan media pembelajaran namun juga untuk mengetahui kelayakan dari media tersebut serta keefektifan dari media pembelajaran whiteboard animation pada materi kegiatan ekonomi muatan pembelajaran IPAS. Penelitian yang digunakan oleh peneliti menggunakan metode Research and Development (R&D), serta metode yang digunakan menggunakan metode ADDIE. Kemudian, untuk pengumpulan data yang dilakukan peneliti melalui observasi, wawancara, serta hasil belajar siswa. Untuk subjek dalam penelitian ini yaitu peserta didik, guru, serta tim ahli (ahli media dan ahli materi). Penggunaan teknik deskriptif kualitatif, deskriptif kuantitatif, dan juga statistik inferensial menjadi teknik dalam menganalisis data pada pengembangan media pembelajaran ini. Hasil yang di dapat dalam penelitian ini dari uji ahli media 90%, uji ahli materi 92%, uji guru 90%, uji kelompok kecil 91,25%, uji kelompok besar 95%, serta hasil dari pretest dan posttest untuk menguji keefektifitas media yang dikembangkan yang memiliki hasil sangat layak dari kelompok kecil maupun besar. Hasil N-gain yang menyatakan bahwa media whiteboard animation memiliki kategori layak dalam penggunaan pada proses pembelajaran materi kegiatan ekonomi muatan IPAS.

ABSTRACT

Based on the observations made by researchers in class IV elementary schools, it is proven that there are problems in the learning process and the need for more types and kinds of learning media used, one of which is the Natural and Social Sciences (IPAS) learning content. The researcher conducted this research to develop creative and innovative learning media to foster students' higher interest in learning. This research aims to develop learning media and find out the feasibility of this media and the effectiveness of whiteboard animation learning media on economic activity material for science and science learning content. The research used by researchers uses the Research and Development (R&D) method and the method used uses the ADDIE method. Then, researchers collected data through observation, interviews, and student learning results. The subjects in this research are students, teachers, and a team of experts (media experts and material experts). Qualitative descriptive techniques, quantitative descriptive techniques, and differential statistics are techniques for analyzing data in the development of this learning media. The results obtained in this research were from the media expert test 90%, material expert test 92%, teacher test 90%, small group test 91.25%, large group test 95%, as well as the results of the pre-test and post-test to test the effectiveness of the media used developed that has very feasible results from both small and large groups. The results of N-gain state that the whiteboard animation media has a suitable category for use in the learning process of economic activity material with IPAS content

1. INTRODUCTION

Education is an activity that can develop and improve the talents of students in order to improve the quality of education. Sujana explained that education has goals and principles to create moral, well-behaved individuals, have obligations and responsibilities, and are logical (Bakhri et al., 2019; Laela, 2023). This is also aligned with the Law National Education System Number 20 of 2003 Article 1 states that education is a self-sensitive and structured activity to produce an atmosphere and a more active learning process in developing the potential of a learner to have religious strength, self-strength, intelligence, as well as talent skills for himself as well as others and the nation and state, education has an essential role in planning for graduates who meet the conditions or qualifications according to 21st-century skills, these skills include skills in problem-solving, critical thinking, unity, communicative, and creativity (Septikasari & Frasandy, 2018; Trilling, B., & Fadel, 2009). Education is also a matter of character building in each individual or student. Education is hoped to help students become competent individuals (Jufriadi et al., 2022; Simbolon & Koeswanti, 2020). Education seeks to develop consistency to prepare each individual for what society needs and expects based on the developments that occur today (Cahyanti & Nuroh, 2023; Saifuillah, 2018).

In education, there is curriculum development, an action or activity, and control given to the government in developing and improving the quality of education so that it is better and of higher quality in Indonesia, which is adjusted to the times. This curriculum is a guide or instructor in learning activities that cannot be separated in the education system (Azhar Juliantri et al., 2017; Mutiani, 2021) as stated in the Decree of the Minister of Education, Culture, Research, and Technology Number 56 of 2022 concerning Guidelines for Curriculum Implementation aimed at restoring learning which will be refined through the Decree of the Minister of Education, Culture, Research and Technology Number 262 of 2022 concerning Amendments to the Decree of the Minister of Education, Culture, Research and Technology Number 56 / M / 2022 concerning Curriculum Guidelines in Learning Recovery, which refers to the Merdeka curriculum system for SD / MI/package A programs set by the government consisting of a project to strengthen the Pancasila student profile (P5) and extracurricular which is allocated approximately 20% of the total number of lesson hours per year.

The independent curriculum gives each school education unit freedom for teachers and students to develop learning. Each learner is convinced to have their talents, and the teacher, as an educator, should take care of them according to the natural laws of the participants. This means that educating each child by educators or teachers is the same as educating society. This independent study aims to create more appropriate and efficient innovations for all exponents and materials in education in Indonesia to realize the revival of education as a whole (Hamzah et al., 2022; Nugraha, 2022).

In the curriculum changes, some of the material coverage that students must understand is the Natural and Social Sciences learning material. Natural and Social Sciences are two combined learnings in the content of science and social studies. The two learning contents become one of the main lessons students must learn (Agustina et al., 2022; Marlina, 2022). The learning content of Natural and Social Sciences equips learners to solve problems that occur in life by connecting the application of science concepts. By studying the Natural and Social Sciences project, the acquisition of capabilities in solving problems carried out by learners to make the right decisions in order to feel comfortable in their lives, better as well as healthier (Merintika. L et al., 2021; Supandi & Senam, 2019).

Using the content of Natural and Social Sciences, students are taught the many cultures and local wisdom related to the content of Natural and Social Sciences and how to solve problems. The merger of science content and social studies content into Natural and Social Sciences, as seen from the implementation of social studies learning in Indonesia, still has obstacles. Teachers need to provide variations in the use of learning methods, utilization of facilities, and school infrastructure to make learning in schools tend to be conventional. Students only listen to the teacher when delivering material, which makes learning passive (Agustina et al., 2022; Hidayah & Ulva, 2017). Learning resources that do not attract students' attention also cause boredom, which occurs in the learning process, leading to a lack of understanding of student material, which lowers learning outcomes.

Based on the observations, interviews, document data, and student learning outcomes at SDN Badegan 02 Pati. The problems encountered with using facilities and infrastructure that could be more intelligent, the lack of learning innovations that cause student learning outcomes to be low, and the methods used in the learning process are still conventional. During the learning of Natural and Social Sciences, the fourth-grade teacher in classroom management still needs to be optimal; the method used by the teacher is one-way. From these problems, there is a need for learning media to improve student learning outcomes and increase student enthusiasm, especially in the learning content of Natural and Social Sciences on the material of economic activities.

Learning media can be used in any learning content to attract students' attention and make them more active in learning. One of the learning media is needed in the content of Natural and Social Sciences material on economic activities. Learning media must be adapted to the use of concrete objects and the suitability of learning media and the intended material. One of the uses of media suitable in the learning content of Natural and Social Sciences is the provision of animated videos with interesting icons (Izzaturahma et al., 2021; Patriani & Kusumaningrum, 2020). So, it can be concluded that using whiteboard animation media will provide an interesting experience to students in the content of Natural and Social Sciences in class IV SDN Badegan 02 Pati. The development of technology in this day and age is of great concern and influence on the educational aspect. The application of technology in the learning process makes it easier for students to follow the learning process (Hakky et al., 2018; Torres-Gastelú & Kiss, 2016). Learning media is one of the tools used to distribute material information to students to reinforce the material taught. The use of learning media is not only conventional but also enriched by extensive innovation and creativity carried out by teachers with modern electronic media such as laptops, audio-visual, and others by utilizing the available internet facilities (Lia et al., 2023; Tarwiti, C., & Wijayanti, 2018). Learning media is very diverse, one of which is learning media based on whiteboard animation.

According to previous research, whiteboard animation is often known as video sketching, scribing, video explainer, or video doodle. This multimedia creation technique uses images and symbols (Ardian et al., 2022). The technique used in this multimedia is based on a whiteboard. The media whiteboard animation aims to help the audience describe the structure of what is explained through the video. In line with the opinion of other research, whiteboard animation media with animation that makes images and lines is considered a tool to emphasize a learning environment that can affect students' emotions and encourage learning (Plass et al., 2014).

Whiteboard animation is one of the learning media with unique particularities, which can provide learning presentations with creative content combining design, colors, and images that can attract students' attention (Ardian et al., 2022; Suhroh et al., 2020). Whiteboard animation is a combination of moving audio-visual media. It relies on both the visual and auditory senses of the audio-visual media. Primary school learners generally learn from what they hear and see (Hikmah & Purnamasari, 2017; Rachmawati et al., 2021). According to previous researchers, whiteboard animation is a form of drawing or writing on a whiteboard that makes a characteristic technique that contains a storyboard or story (Helianthusonfri J., 2019).

Media whiteboard animation can be said to be popular because of the delivery of messages that are clear and easy to understand. In the video media display, whiteboard animation has a simple appearance; in manufacturing media, it is quite easy to make. Learning media whiteboard animation is universal and can be used anytime and anywhere to explain a topic, education, profile videos, etc. According to previous research, video media whiteboard animation is designed using moving animations, material concepts, and images (Anggraini et al., 2021). It is expected that the existence of learning media based on whiteboard animation can facilitate the learning process, facilitate educators in delivering material, and attract students' attention. Media whiteboard animation has many benefits for students. In addition to increasing student interest in learning, it also moves the way students think with logical reasoning and awareness. As well as with the media can improve in terms of remembering the material presented and can distinguish the abilities of students from how much their memory capacity is in their head. Media whiteboard animation is one way to positively impact students' learning outcomes and motivate them to study hard (Ardian et al., 2022; Suhroh et al., 2020). This study aims to develop learning media and determine the feasibility of the media and the effectiveness of learning media whiteboard animation on the material of economic activities in the learning content of Natural and Social Sciences.

2. METHOD

This study uses the type of research research and Development (R & D). Using R&D development research becomes a systematic way of making preparations or designs and improving the products developed. With product development, it is necessary to prepare several things, such as design or design, product quality, innovation used in product development, and marketing used in product management (Sugiyono, 2019). This research is tailored to the user's needs when developing a product. The model used in this research is the ADDIE model, a development model that shows the design stages of moderate learning so that its users can easily learn it. This model has five phases: analysis, design, development, implementation, and evaluation. This ADDIE model can be structured and organized. It is hoped that this research in developing a product, one of which is animated video media, can provide tools and facilitate teachers in an interesting, effective, and efficient learning process.

There is an evaluation sheet, which is an instrument for reviewing this research on the development of learning media whiteboard animation. With this validation sheet, it can be filled in and assessed by a team of media and material experts. Then, the subjects in this study focused on fourth-grade students, class teachers, and media and material experts. The first stage that must be done is to analyze, through identification conducted by researchers in the form of observations and interviews, the results of fourth-grade value data. The second stage is design or design. This stage focuses on the preparation of learning media whiteboard animation from the initial design that wants to be made from images, animations, audio, color combinations, and others, which will become instructions and can be assessed.

Furthermore, at the improvement or development stage, this stage the researcher designs and then creates the media product whiteboard animation. Furthermore, researchers can check and improve the developed media again. Once completed, the developed media product can be submitted to the experts. Then, questionnaires were made for students, a team of experts (media experts and material experts), and teachers. The questionnaire contains their responses to the media developed by researchers. Then verification, this stage is carried out by a team of experts in developing learning media whiteboard animation. Next is the Implementation stage. This stage aims to provide evidence of whether the media produces something good, starting from the feasibility of the media and the developed product's effectiveness. The existence of a team of experts is one of the requirements in the feasibility test of a product developed by researchers. Large and small groups of sixth-grade students are the subjects in the test of the developed products.

The last stage is the evaluation stage. This stage aims to check from the implementation results whether the media products used have weaknesses or deficiencies that researchers can later correct. Then, the revised results make effective media appropriate for use by the objectives achieved. If there is no media revision, the media is suitable for use. The instrument grids are shown in [Table 1](#), [Table 2](#), and [Table 3](#),

Table 1. Media Expert Instrument Grid

Aspect	Indicator	Item	Total Item
Suitability	Suitability of media to learning topics	Suitability of media to learning outcomes	3
Appearance	Form of display of learning media	The accuracy of the whiteboard animation learning media with the learning objectives achieved	6
		The suitability between images, written text, animated movements, and sounds in whiteboard animation is related to the material.	
		The size of the text, images, and animations in the whiteboard animation media can be seen clearly. A quiz was presented to students on whiteboard animation media.	
Usage	Media use by teachers and students	Accurate layout of the background, placement of images and animations correctly without disturbing the content of the material inside Whiteboard animation media display that is visible in audio-visual terms	3
		Menu sections are visible.	
		Accuracy of menu placement	
Superiority	Media understanding by users	Whiteboard animation learning media is easy to use	3
		The whiteboard animation learning media has clear instructions for use.	
		Whiteboard animation media can be used repeatedly.	
		The existence of whiteboard animation learning media can provoke student responses	3
		The existence of whiteboard animation media can provide two-way communication.	
		Students more easily accept recipients of information.	
Total			15

Table 2. Material Expert Instrument Grid

Aspect	Indicator	Item	Total Item
Competency	Suitability of Natural and Social Science material with learning outcomes	Suitability of material to learning outcomes The material is appropriate to the learning objectives. The material presented can develop the cognitive domain. The material presented is appropriate and can be developed effectively. The material presented is suitable for development in the psychomotor domain.	5
Suitability	Suitability of Natural and Social Sciences learning content material with whiteboard animation learning media	The sequence of material presented in the whiteboard animation media ranges from simple to complex. It is easy to understand the material in the media. Suitability of images presented on whiteboard animation learning media The accuracy and clarity of the images on the whiteboard animation media can make it easier for students. The videos presented can clarify the material. Can foster students' curiosity about the material studied in the whiteboard animation learning media The suitability of the quiz on the whiteboard animation media is to the material. Evaluation questions are by learning outcomes.	8
Language	Media use by teachers and students	Whiteboard animation learning media is easy to use The whiteboard animation learning media has clear instructions for use. Whiteboard animation media can be used repeatedly.	3
Total			16

Table 3. Prospective teacher and learner instruments

Aspect	Indicator	Item	Total Item
Display	Suitability of media with learning topics	The display of whiteboard animation media can attract attention All whiteboard animation learning media devices look real. The font and size used are accurate and legible. The selection of images, audio, placement, and video is appropriate so that it can be understood.	4
Material / Content	Form of display of learning media	The content in the learning media whiteboard animation material about economic activities is appropriate. The material shown is sufficient to add knowledge and understanding to participants' educators.	2
Media Usage	Media use by teachers and students	The video learning media whiteboard animation can be learned individually and in groups. The learning media whiteboard animation can motivate learners to continue learning. With the use of learning media, whiteboard animation makes learning more fun.	3
Time	Media understanding by users	Accurate selection of time allocation	1
Total			10

In this research activity in developing a product, the use of inferential statistical methods for hypothesis testing on whiteboard animation video media products developed by researchers using statistical formulas. The analysis technique is used to find the measurement results of the pre-test and post-test test instruments before and after the use of video media whiteboard animation in improving students' understanding of the material of economic activities in the IPAS learning content to determine the effectiveness of the media whiteboard animation developed by the researcher. Furthermore, the difference from the previous results was determined using the dependent sample t-test. This is followed by using the N-gain test to determine the increase in student learning outcomes obtained from the pre-test and post-test results of the difference between the maximum score and the pre-test obtained.

3. RESULT AND DISCUSSION

Result

Research conducted by researchers in developing an animated video learning media product has three main points: effectiveness, feasibility, and learning media whiteboard animation. /The model used by researchers in developing this media uses the ADDIE model, which has five stages: analysis, design, implementation, assessment, and evaluation. Activities carried out by researchers at the beginning of the study by conducting observations, interviews with class teachers, and data on student learning outcomes in the fourth grade of SDN Badengan 02 Pati into the analysis stage is the initial stage in the research. In the interview activities carried out by the researcher with the class teacher, there were questions about the learning content of Natural and Social Sciences and also the problems that occurred in the classroom in the learning process, and the material that was considered difficult in the learning process. Student learning outcomes that still need to be improved have yet to meet the Minimum Completeness Criteria standards. Not only that, researchers and teachers also discuss the need for the ideal use of learning media in the learning process in the classroom on the material of economic activities in Chapter 7, topic C.

The next stage is the design stage. This stage is an overview of the product developed, namely the media whiteboard animation. Before being submitted to a team of experts, researchers can see and examine again from the media whiteboard animation developed. If it has been declared complete, it can be given to a team of experts to ask for value in product development by filling out a validator questionnaire. In addition to the expert team, teachers and students also completed questionnaires from researchers regarding developing learning media whiteboard animation. The results of the product developed by researchers, namely the media whiteboard animation, can be seen in [Figure 1](#).



Figure 1. Media Development Results

The next stage is the implementation stage. This stage explains the product developed by the researcher and whether the product is appropriate to be used as a tool to assist the learning process in the classroom, especially in grade four economic activity material. The ability to determine whether the media is effective can be witnessed from the pre-test and post-test results given to students. Give the test twice, from before to after using the product. This is done to determine students' knowledge and initial understanding of the provision of material without using media. Then, the learning media is given to test students' understanding of the material presented.

To fill out a questionnaire regarding video learning media whiteboard animation before the pre-test and post-test questions are given. Furthermore, product testing can be done by utilizing the t-test, which can produce differences between before and after media use. Then, the use of the N-gain test aims to determine whether the results of the maximum score of the pre-test and post-test can provide student learning outcomes more improved or developed.

Affirmation on a product developed by researchers, i.e., media video. Learning video whiteboard animation with validation for team experts. Media trials can also be carried out with small groups of 17 students and small groups of 6 students. The results of the product validity test are shown in [Table 4](#).

Table 4. Product Validity Test Results

No.	Trial Subject	Validity Results	Description
1.	Media Expert Test	90%	Very Feasible
2.	Material Expert Test	92 %	Very Feasible
3.	Class Teacher Test	90%	Very Feasible
4.	Small Group Trial	91.25%	Very Feasible
5.	Large Group Trial	95%	Very Feasible

Based on [Table 4](#), it is known that the validity results of each expert and group get a very feasible category. Then, the product effectiveness test stage (average) is presented in [Table 5](#), and finally, the N-gain test results in [Table 6](#).

Table 5. Product Effectiveness t-test Results (Average)

No.	Trial Subject	Validity Results	Description
1.	Small Group Trial	52.05	85.00
2.	Large Group Trial	56.18	81.47

Table 6. N-gain Test Results

Class	Number of students	Average		N-gain	Criteria
		Pre-test	Post-test		
Small Group	6	52.05	85.00	0.696	Medium
Large Group	17	56.18	81.47	0.593	Medium

From the above results, it can be said that the video learning media whiteboard animation is included in the category of media that is feasible to use and is quite effective in learning to take place in the fourth grade of SDN Badengan 02 Pati on the material of economic activities. In this study, the effectiveness of the media can be proven by the increase in student's knowledge from before and after using the learning media whiteboard animation in the fourth grade of SDN Badengan 02 Pati on the material of economic activities.

Discussion

Based on the results of the data description in the table above, the learning media whiteboard animation is quite effective. With the element of influence in the purpose of using learning media whiteboard animation, first using the ADDIE model is appropriate and organized because this model has five phases of analysis, planning, utilization, management, and also evaluation stages that can improve student learning outcomes much higher than before and can be believed with the existence of video learning media whiteboard animation can be feasible to use in learning ([Achmad et al., 2019](#); [Schneider et al., 2023](#)). Second, with the existence of video learning media, whiteboard animation in the classroom's teaching and learning process activities can provide facilities for students to make it easier to understand the material. In video media, whiteboard animation has many icons, such as the presence of moving animations, clear

audio, and encouragement for students, as well as text in the media that makes it easier for students to read the material through video learning media whiteboard animation and give students higher interest in learning (Anggraini et al., 2021; Ardian et al., 2022). With the video media whiteboard animation, which provides a presentation of learning materials that can optimize time, students are more focused on the material presented by the teacher.

Third, whiteboard animation is arranged according to the learning outcomes achieved in presenting the material in the learning media. The existence of learning media whiteboard animation increases the focus of students in understanding the learning material that takes place, especially in the learning content of Natural and Social Sciences on economic activities in grade six. The existence of video learning media whiteboard animation becomes a tool for educators in the learning process that makes the quality of learning much more interesting and easy for students to understand (Anggraini et al., 2021; Hita et al., 2021). With the use of video learning media, whiteboard animation on the material of economic activities in the content of Natural and Social Sciences is the right strategy to make learning more qualified. Therefore, with video learning media, whiteboard animation can provide material capture and meaning of learning that is much more fun.

Fourth, researchers developed video learning media whiteboard animation. There are findings of previous research also state that the use of video learning media whiteboard animation can provide higher student interest in reading and also increase student learning outcomes by using video learning media whiteboard animation (Ardian et al., 2022; Suhroh et al., 2020). With the existence of learning media, whiteboard animation can package and visualize clearly and interestingly the material it presents. The format used in this video media whiteboard animation is animated with a white background (such as a blackboard) (Anggraini et al., 2021; Hafiza et al., 2022). Learning with video media whiteboard animation provides an independent learning solution not hindered by distance and time. Video whiteboard animation can be used to deliver material, especially material for economic activities of IPAS content.

Based on the explanation above, previous research suggests that video media whiteboard animation can be used in the learning process and in its effective use. Using this media has a good impact. It is useful in developing students' learning to be more active, which ultimately improves student learning outcomes (Hapsari & Zulherman, 2021; Iksar & Satriyani, 2021). Implications of this research found that using whiteboard animation learning media can increase student engagement in learning. Animation can make the material more interesting and easy to understand for students, thus increasing their interest in economics lessons. Teachers must develop their creativity in creating and using whiteboard animation learning media. This can open the door for more innovative and engaging learning approaches in teaching economics in grade four.

4. CONCLUSION

From the results of this research in developing video learning media whiteboard animation, especially on the material of economic activities in the content of Natural and Social Sciences learning in grade four, it can be concluded that video learning media whiteboard animation can have a good impact on teaching and learning activities in the classroom in the material of economic activities in the content of Natural and Social Sciences learning. Video media whiteboard animation is feasible and effective for students in learning. With the existence of learning media, whiteboard animation positively impacts learning outcomes, which are much more improved than before the use of learning media. Students find it much easier to understand the material with the help of learning media in the fourth grade of SDN Badengan 02 Pati.

5. REFERENCES

- Achmad, B., Arif, W., & Yovita, Y. (2019). Whiteboard Animation Media Development with Smart Pedagogy Approach in Educational Policy Courses. *1st International Conference on Education and Social Science Research (ICESRE)*, 268–270. <https://doi.org/10.2991/icesre-18.2019.59>.
- Agustina, N. S., Robandi, B., Rosmiati, I., & Maulana, Y. (2022). Analisis Pedagogical Content Knowledge terhadap Buku Guru IPAS pada Muatan IPA Sekolah Dasar Kurikulum Merdeka. *Jurnal Basicedu*, 6(5), 9180–9187. <https://doi.org/10.31004/basicedu.v6i5.3662>.
- Anggraini, A. I., Warsono, Hamidiyah, H., & Jatmika, S. (2021). Developing Whiteboard Animation Video Through Local Wisdom on Work and Energy Materials as Physics Learning Solutions During the Covid-19 Pandemic. *Proceedings of the 6th International Seminar on Science Education (ISSE 2020)*, 541 (Isse 2020), 394–400. <https://doi.org/10.2991/assehr.k.210326.056>.

- Ardian, N., Hutasuhut, M. A., & Rohani, R. (2022). Pengembangan Media Pembelajaran Berbasis Whiteboard Animation Dalam Pembelajaran Biologi Kelas XI Pada Materi Sistem Pencernaan Makanan. *Jurnal Ilmiah Biologi*, 10(2). <https://doi.org/10.33394/bioscientist.v10i2.6296>.
- Azhar Juliantri, L., Sumaryanto Florentinus, T., Wibawanto, H., & Artikel, S. (2017). Pengembangan E-Rapor Kurikulum 2013 Berbasis Web di SMK Negeri 1 Slawi. *Innovative Journal of Curriculum and Educational Technology IJCET*, 6(1), 11–16. <https://journal.unnes.ac.id/sju/index.php/ujet/article/view/15571>.
- Bakhri, S., Sari, A. F., & Ernawati, A. (2019). Kualitas Pembelajaran Kontekstual Siswa IPS Materi Program Linier yang Memiliki Kecemasan Belajar Matematika. *Kreano Jurnal Matematika Kreatif-Inovatif*, 10(2). <https://doi.org/10.15294/kreano.v10i2.19061>.
- Cahyanti, N. N., & Nuroh, E. Z. (2023). Digital Storytelling Media to Improve Students' Speaking Skills in Elementary School. *Journal of Education Technology*, 7(2), 261–268. <https://doi.org/10.23887/jet.v7i2.58679>.
- Hafiza, M., Marlina, L., & Astuti, R. T. (2022). Pengembangan Media Pembelajaran Whiteboard Animation pada Materi Hidrokarbon sebagai Media Alternatif Pembelajaran Daring. *Jurnal Inovasi Pembelajaran Kimia*, 4(1), 82. <https://doi.org/10.24114/jipk.v4i1.33661>.
- Hakky, M. K., Wirasmita, R. H., & Uska, M. Z. (2018). Pengembangan Media Pembelajaran Berbasis Android untuk Siswa Kelas X Pada Mata Pelajaran Sistem Operasi. *EDUMATIC: Jurnal Pendidikan Informatika*, 2(1), 24–33. <https://doi.org/10.29408/edumatic.v2i1.868>.
- Hamzah, M. R., Mujiwati, Y., Zuhriyah, F. A., & Suryanda, D. (2022). Kurikulum Merdeka Belajar sebagai Wujud Pendidikan yang Memerdekakan Peserta Didik. *Arus Jurnal Pendidikan*, 2(3), 221–226. <https://doi.org/10.57250/ajup.v2i3.112>.
- Hapsari, G. P. P., & Zulherman, Z. (2021). Pengembangan media video animasi berbasis aplikasi canva untuk meningkatkan motivasi dan prestasi belajar siswa. *Jurnal Basicedu*, 5(4), 2384–2394. <https://doi.org/10.31004/basicedu.v5i4.1237>.
- Helianthusonfri J. (2019). *Belajar Membuat Whiteboard Animation untuk Pemula*. Jakarta: PT. Gramedia.
- Hidayah, N., & Ulva, R. K. (2017). Pengembangan Media Pembelajaran Berbasis Komik Pada Mata Pelajaran Ilmu Pengetahuan Sosial Kelas IV MI Nurul Hidayah Roworejo Negerikaton Pesawaran. *Jurnal Pendidikan Dan Pembelajaran Dasar*, 4(1), 34–46. <https://doi.org/10.24042/terampil.v4i1.1804>.
- Hikmah, V. N., & Purnamasari, I. (2017). Pengembangan Video Animasi “Bang Dasi” Berbasis Aplikasi Camtasia Pada Materi Bangun Datar Kelas V Sekolah Dasar. *Pengembangan Video Animasi “Bang Dasi” Berbasis Aplikasi Camtasia Pada Materi Bangun Datar Kelas V Sekolah Dasar*, 4(2), 182–191. <https://doi.org/10.23819/mimbar-sd.v4i2.6352>.
- Hita, A., Shifa, A. F. A., & Gumelar, M. R. M. (2021). Peningkatan Pembelajaran Melalui Media Pembelajaran Video Animasi untuk Sekolah Dasar. *Inovasi Kurikulum*, 18(1), 115–127. <https://doi.org/10.17509/jik.v18i1.42680>.
- Ikasar, Y. P., & Satriyani, F. Y. (2021). Pengembangan Media Pembelajaran Video Animasi Materi Tata Surya di Kelas VI Sekolah Dasar Muhammadiyah 06 Tebet Jakarta. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, 5. <http://ejournal.unp.ac.id/index.php/jippsd/article/download/114878/pdf>.
- Izzaturahma, E., Mahadewi, P. L. P., & Simamora, A. H. (2021). Pengembangan Media Pembelajaran Video Animasi Berbasis ADDIE pada Pembelajaran Tema 5 Cuaca untuk Siswa Kelas III Sekolah Dasar. *Jurnal Edutech Undiksha*, 9(2), 216–224. <https://doi.org/https://doi.org/10.23887/jeu.v9i2.38646>.
- Jufriadi, A., Huda, C., Aji, S. D., Pratiwi, H. Y., & Ayu, H. D. (2022). Analisis Keterampilan Abad 21 Melalui Implementasi Kurikulum Merdeka Belajar Kampus Merdeka. *Jurnal Pendidikan Dan Kebudayaan*, 7(1), 39–53. <https://doi.org/10.24832/jpnk.v7i1.2482>.
- Laela, N. (2023). Kreativitas Guru dalam Pengembangan Media Pembelajaran IPS di MI Ma'arif NU Ajibarang Kulon. *Jurnal Kependidikan*, 11(1). <https://doi.org/10.24090/jk.v11i1.8084>.
- Lia, L. K. A., Atikah, C., & Nulhakim, L. (2023). Pengembangan Media Pembelajaran Video Animasi Berbasis Animaker Untuk Meningkatkan Hasil Belajar Siswa Sd. *Jurnal Ilmiah Pendidikan Citra Bakti*, 10(2), 386–400. <https://doi.org/10.38048/jipcb.v10i2.1634>.
- Marlina, T. (2022). Urgensi Dan Implikasi Pelaksanaan Kurikulum Merdeka Pada Sekolah Dasar/Madrasah Ibtidaiyah. *Prosiding Seminar Nasional Pendidikan Ekonomi*, 67–72. <https://prosiding.ummmetro.ac.id/index.php/snpe/article/view/24>.
- Merintika, L. S., Pratiwi, P. H., & Martiana, A. (2021). Penerapan Metode Pembelajaran Group Investigation (GI) Untuk Meningkatkan Kompetensi Investigasi Kelompok Pada Siswa Kelas XI IPS 1 SMA Negeri 11 Yogyakarta. *DIMENSIA: Jurnal Kajian Sosiologi*, 10(1). <https://doi.org/10.21831/dimensia.v10i1.41049>.

- Mutiani. (2021). Pembinaan Etika Peserta Didik Melalui Pembelajaran Tematik - Integratif di Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, 3(3). <https://doi.org/10.31004/edukatif.v3i3.397>.
- Nugraha, T. S. (2022). Kurikulum Merdeka untuk pemulihan krisis pembelajaran. *Inovasi Kurikulum*, 19(2), 251–262. <https://doi.org/10.17509/jik.v19i2.45301>.
- Patriani, R. P., & Kusumaningrum, I. (2020). Pengembangan Media Pembelajaran Interaktif Berbasis Android Untuk Pembelajaran Teknik Animasi 2 Dan 3 Dimensi Kelas XI Sekolah Menengah Kejuruan. *Jurnal Penelitian IPTEKS*, 5(2). <https://doi.org/10.32528/ipteks.v5i2.3651>.
- Plass, J. L., Heidig, S., Hayward, E. O., Homer, B. D., & Um, E. (2014). Emotional design in multimedia learning: effects of shape and color on affect and learning. *Learning and Instruction*, 29, 128e140. <https://doi.org/10.1016/j.learninstruc.2013.02.006>.
- Rachmawati, N., Marini, A., Nafiah, M., & Nurashah, I. (2021). Projek Penguatan Profil Pelajar Pancasila dalam Implementasi Kurikulum Prototipe di Sekolah Penggerak Jenjang Sekolah Dasar. *Jurnal Basicedu*, 5(6), 6349_6356. <https://doi.org/10.31004/basicedu.v6i3.2714>.
- Saifuillah, A. (2018). Implementasi Model Project Based Learning untuk Mengembangkan Soft Skills dan Kualitas Hasil Belajar Siswa. *Jurnal Pendidikan Kewarganegaraan*, 5(2), 137–150. <https://doi.org/10.32493/jpkn.v5i2.y2018.p137-150>.
- Schneider, S., Krieglstein, F., Beege, M., & Rey, G. D. (2023). Successful learning with whiteboard animations – A question of their procedural character or narrative embedding? *Heliyon*, 9(2), 13229. <https://doi.org/10.1016/j.heliyon.2023.e13229>.
- Septikasari, R., & Frasandy, R. N. (2018). Keterampilan 4C Abad 21 Dalam Pembelajaran Pendidikan Dasar. *Jurnal Tarbiyah Al-Awlad*, 8(2), 112–122. <https://doi.org/10.15548/alawlad.v8i2.1597>.
- Simbolon, R., & Koeswanti, H. D. (2020). Comparison Of Pbl (Project Based Learning) Models With Pbl (Problem Based Learning) Models To Determine Student Learning Outcomes And Motivation. *International Journal of Elementary Education*, 4(4), 519–529. <https://doi.org/10.23887/ijee.v4i4.30087>.
- Sugiyono. (2019). *metode penelitian pendekatan kualitatif, kuantitatif dan R & D*. Alfabeta.
- Suhroh, F., Yudi Cahyono, B., & Praba Astuti, U. (2020). Effect of Using Whiteboard Animation in Project-Based Learning on Indonesian EFL Students' English Presentation Skills across Creativity Levels. *Arab World English Journal*, 6(6), 212–227. <https://doi.org/10.24093/awej/call6.14>.
- Supandi, M., & Senam, S. (2019). Mengembangkan keterampilan berpikir kritis dengan game ritual tumpe. *Jurnal Inovasi Pendidikan IPA*, 5(2), 139–146. <https://doi.org/10.21831/jipi.v5i2.25920>.
- Tarwiti, C., & Wijayanti, A. (2018). Pengembangan Media Kotak Ajaib Pada Mata Pelajaran IPA Materi Pesawat Sederhana Siswa Kelas V Sekolah Dasar. *Jurnal Sekolah (JS)*, 2(4), 308–314. <https://doi.org/10.24114/js.v2i4.10678>.
- Torres-Gastelú, C. A., & Kiss, G. (2016). Perceptions of students towards ICT competencies at the University. *Informatics in Education*, 15(2), 319–338. <https://doi.org/10.15388/infedu.2016.16>.
- Trilling, B., & Fadel, C. (2009). 21st Century Skills_ Learning for Life in Our Times. *Journal of Sustainable Development Education and Research*, 2(1), 243. <https://search.informit.org/doi/pdf/10.3316/informit.216211330916471>.