Validity of Animated Video-Based Learning Media Development Using Adobe After Effect Application in Grade IV Elementary School

Miranda[1], Taali[2*], Irdamurni[1], Abdul Habib Arrasyidi Desky[2], Ganefri[2], Asmar Yulastri[2], Elfizon[2]

[1] Undergraduate Program in Basic Education Graduate Program, Universitas Negeri Padang, Padang, Indonesia.
[2] Postgraduate Technical and Vocational Education Program, Universitas Negeri Padang, Padang, Indonesia.

Abstract: This study aimed to develop Indonesian language learning media based on animated videos created with Adobe After Effects for fourth-grade elementary school students. The research employed a Research and Development (R&D) approach using the 4D development model. The research subjects consisted of media experts, material experts, linguists, and Focus Group Discussion (FGD) participants. Data were collected through observation sheets, interview questionnaires, and validation instruments, and analyzed using qualitative and quantitative descriptive techniques. Validation results from experts indicated that the developed media was categorized as "very valid" in all aspects, including media (88.00), material (94.00), and language (90.00). The results of FGDs with teachers showed that the learning media was highly feasible for classroom use, with scores for content feasibility (91.60), language accuracy (92.00), presentation (85.60), and graphics (93.50), resulting in an overall average score of 90.69. The developed media meets key characteristics of effective learning media, as it is engaging, easy to operate, and supports meaningful learning processes. In conclusion, animated video-based learning media using Adobe After Effects is valid, feasible, and appropriate for use in Indonesian language learning at the elementary school level.

Keywords: Adobe after effect; Animated video; Development; Elementary school; Validity

Introduction

Education plays a fundamental role in developing human potential, shaping character, and improving the quality of human resources (Rahayu et al., 2021). The rapid advancement of information and communication technology has transformed learning patterns and created an urgent demand for innovative, technology-integrated instructional media that support meaningful learning experiences (Astuti et al., 2021). In this context, animated video-based learning media offers a pedagogically relevant solution by presenting abstract concepts through dynamic visual representations that enhance students' attention, motivation, and conceptual understanding, particularly at the elementary school level where learners are in the concrete operational stage of cognitive development (Lubis et al., 2020).

The novelty of this study lies in the systematic development of Indonesian language learning media using professional animation software (Adobe after Effects) through the 4D development model, combined with comprehensive validation by media experts, material experts, and linguists. Unlike previous studies that primarily examine media effectiveness, this research emphasizes structured development procedures, pedagogical alignment, and empirical feasibility testing for elementary education contexts (Juniati et al., 2023).

This research is significant due to the limited availability of validated, technology-based Indonesian

language learning media that are pedagogically appropriate, visually engaging, and practically applicable in elementary classrooms. Therefore, the study contributes both theoretically to technology-based instructional media development and practically to improving the quality of language learning in primary education (Agboola et al., 2012; Hanif, 2020).

One form of development of a video media technology is an animated video from Adobe after Effect. Learning using video or animation is more successful because it is able to enter through 2 human sensory sensors, namely through the eyes and ears (Bulkani et al., 2022).

75% of a person's learning experience is obtained from the sense of sight (eyes), 13% through the sense of hearing (ears) and the rest through other senses. The use of animated video learning media in the learning process can increase student motivation, interest and learning outcomes. The use of learning media will be very helpful in the learning process and the delivery of learning materials in an interesting way can improve student understanding (Bilqis et al., 2025). The development of animated video learning media requires tools in the form of software to support the process of making animated videos. Therefore, the tool in developing this animated video is to use Adobe After Effect software which helps in making animations that are able to move so that they look like they have the illusion of movement (Asnur et al., 2025).

So far, the learning media used by teachers is only printed learning media, such as printed pictures, and utilizing used items that can be recycled to become learning media. Therefore, learning media so far has not utilized existing technology, even though if utilizing learning technology can be better understood by students and increase student motivation (Sudianti et al., 2025).

The use of e-modules also helps students understand the material better because it can present interactive content such as animations, audio, video, and digital navigation. E-modules can also be developed using software such as Adobe Flash Player/CorelDraw to produce attractive applications that can be accessed through the Android operating system, in accordance with the devices owned by students (Ningsih et al., 2025). The learning media in grade IV of the Merdeka Curriculum Elementary School is image media. Image media is one of the techniques in learning that can be used as a variety in writing skills. Image media is a very basic form of communication media (Desky, Taali, et al., 2025).

Images not only function as entertainment. But more than that, pictures have a very big function. pictures are imitations of items (people, animals, plants, and so on). Images become two-dimensional visual

media on a non-transparent plane (Lestari et al., 2019). Images can be used by teachers as a place to provide explanations so that they are more concrete than if they are only described in words. Through images, teachers can translate abstract ideas in a more realistic form. Image media has its own types, for example serialized images (Cholilah et al., 2023). Serial picture media is media used in visual learning that provides a series of pictures about something so that the explanation is more concrete than described through words. Through serialized images, teachers can translate abstract ideas that are more realistic and easier to stimulate students' imagination (Rahayu et al., 2021).

In the past, learning was only played by the teacher completely, for example by the teacher telling folklore and students listening or students only reading printed books, now it can be replaced through technological devices that can provide new experiences for students (Deviana et al., 2025).

Teaching media is an instructional component that includes messages, people, and equipment. In its development, teaching media follows the development of technology. The oldest technology utilized in the learning process is printing which works on the basis of mechanical principles. Then audio-visual technology was born (Yulirismayenti et al., 2025).

Audio-visual technology is a way of producing or delivering material using mechanical and electronic machines to present audio and visual messages. Teaching through audio-visual is clearly characterized by using hardware during the learning process, such as film projector machines, tape recorders, and wide visual projectors (Fiona et al., 2025).

So teaching through animated video (audio visual) is the production and use of materials whose absorption is through sight and hearing and does not entirely depend on understanding words or similar symbols (Ermawalis et al., 2025). Examples of audio-visual learning media are animated videos, namely animated videos are often called animation only, which means moving images that come from a collection of various objects that are specially arranged so that they move according to a predetermined flow at each count of time. The objects in question are human images, text writing, animal images, plant images, buildings, etc (Cholilah et al., 2023).

This is because students in this era of independent learning are known as the millennial generation who are digitally literate. The characteristics of the millennial generation tend to be confident and creative, forming a smart person in socializing and surfing social media and the internet (Pitriani et al., 2021). To balance the character of students and their learning flow well, educators need to realize that the need for the use of technology in creating efficient and effective learning

conditions in order to realize meaningful learning.In order for students to meet their learning goals, teachers and schools must be able to prepare complete infrastructure and learning models. Teachers must also have the ability to design educational activities (Fernando et al., 2024).

Students' lack of motivation to learn Indonesian is due to the teacher's lack of creativity in teaching. In addition, the lack of learning media is also one of the factors that make students' learning motivation low. The low motivation of students in learning Indonesian and the low interest of students to re-read the lessons they have learned also have an impact on their learning outcomes (Desky, Ganefri, et al., 2025).

Furthermore, to see the conditions in the field, the researcher conducted a preliminary study to elementary schools in Gugus VI, Koto Tangah District, Padang City, namely SDN 28 Padang Sarai, SDN 27 Anak Air, and SDN 35 Padang Sarai. The feasibility study was carried out by analyzing the problems and needs as well as the characteristics of the students whose data were taken from the results of observations and interviews conducted with class IV teachers at the elementary school. Researchers also observed students' responses when carrying out the learning process (Landong et al., 2024).

Students' lack of motivation to learn Indonesian is due to the teacher's lack of creativity in teaching. In addition, the lack of learning media is also one of the factors that make students' learning motivation low. The low motivation of students in learning Indonesian and the low interest of students to re-read the lessons they have learned also have an impact on their learning outcomes (Syamsu, 2017).

Furthermore, to see the conditions in the field, the researcher conducted a preliminary study to elementary schools in Gugus VI, Koto Tangah District, Padang City, namely SDN 28 Padang Sarai, SDN 27 Anak Air, and SDN 35 Padang Sarai. The feasibility study was carried out by analyzing the problems and needs as well as the characteristics of the students whose data were taken from the results of observations and interviews conducted with class IV teachers at the elementary school. Researchers also observed students' responses when carrying out the learning process.

The results of these observations show that the motivation shown by students during Indonesian learning is out of place, namely students prefer to be noisy, talk to their friends rather than listen to the teacher, and there are even students who are sleepy when the teacher explains so that learning conditions in the classroom are less conducive.

In delivering Indonesian language lessons, learning media is needed. This Indonesian language learning media is in the form of animated videos. This animated video is useful as an introduction / intermediary for the teacher's message to the recipient of the message, namely the student. This learning media is very necessary in stimulating students' thoughts, feelings, attention, interest and motivation to learn so that the teaching and learning process can run smoothly (Yelianti et al., 2018). Learning media can also be used to increase motivation and teaching and learning interactions and from the results of observations there are teachers who have used learning media but the learning media used are less interesting and less motivating for students. Therefore, it is necessary to develop an interesting learning media according to the needs of students (Alhakiki et al., 2020).

Researchers chose to develop Indonesian learning media using Adobe After Effect applications as a solution to the problem. The rapid advancement of technology in the field of education demands endless innovation in teaching materials. Utilizing current technology helps ensure effective learning (Aghni, 2018). Because it allows teachers to deliver interesting and interactive lessons, the use of technology in the classroom can also increase student motivation (Ariani et al., 2021).

Through the development of animated video-based learning media using Adobe after Effect, it is hoped that it can help teachers to convey material more clearly and shorten time. Learning is also more fun because of the real visualization compared to just reading books and listening to teacher lectures. The animated video to be developed is an animated video of a folktale taken from one of the regions in Indonesia in accordance with Indonesian Language material in grade IV Elementary School.

In the video there is a visualization of the background area of the story, characters as actors in the story, natural appearance and conditions that will be visualized in the form of animation or moving images and later this animated video will be filled with sound as a form of communication between characters and convey messages. Thus, it is expected that learning will be more attractive to students so that learning objectives will be achieved optimally.

Method

This study employed a Research and Development (R&D) approach aimed at producing and validating an educational product in the form of animated video-based Indonesian language learning media. R&D is a systematic process used to develop, validate, and refine educational products to ensure their feasibility and effectiveness in instructional settings (Dermawan et al., 2020). The development procedure followed the 4D model proposed by Thiagarajan, Semmel, and Semmel,

consisting of four stages: Define, Design, Develop, and Disseminate. However, this study was limited to the Develop stage due to time and scope constraints.

The Define stage involved a comprehensive needs analysis, including analysis of initial problems in learning, learner characteristics, curriculum content, task analysis, and formulation of instructional objectives. The Design stage focused on preparing the product blueprint, including media design specifications, storyboard development, and preparation of validation and assessment instruments.

The Develop stage consisted of product production using Adobe after Effects, expert validation by media, material, and language specialists, product revision based on expert feedback, and limited field testing through Focus Group Discussion (FGD) with teachers as an initial feasibility trial. The overall development process is presented in a structured flow diagram to ensure clarity and methodological transparency.
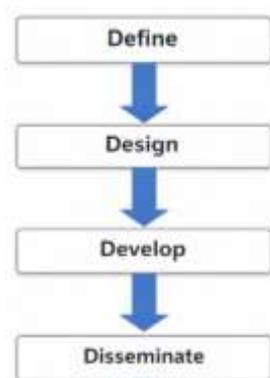

Figure 1. Model 4D

The research stages carried out are, namely, the define stage, the design stage and the development stage. The definition stage is the analysis stage where researchers conduct a needs analysis by collecting information through interviews, observations, teacher and student needs analysis questionnaires. This is with the aim of obtaining information related to the problems experienced by the school to be studied and problem solving solutions from the school to be studied. The design stage, namely developing products or the process of making learning media products. Furthermore, the development stage, which at this stage is carried out feasibility testing of the products made, by validating the products developed to material, language, and media expert validators.

The steps that can be taken at this development stage are: 1) Validation Stage, where at this stage the developed product will be validated by learning media validators using the validation sheet instrument that the researcher has prepared previously. Input and suggestions from learning media validators will be used

for revision or product improvement. After obtaining validation from the validators, data analysis was then carried out from the results of the validation sheet instrument to determine whether the product developed was valid or invalid. 2) Revision Stage, Where at this stage the researcher makes improvements or revisions to the development product based on the results of the instrument in the form of a validation sheet that has been given suggestions, input, and criticism from the validator. 3) Focus Group Discussion (FGD), Where at this stage FGD is a discussion method conducted by teachers and researchers which contains the use of media developed by researchers during learning. This FGD aims to discuss and obtain feedback input from teachers on the operationalization of media developed by researchers. The results of validation and review data from learning media validators and FGD participants are processed to be able to obtain product-related information so that the level of quality and feasibility of interactive learning multimedia is known.

In this study, the research subjects consisted of learning media validators, and FGD participants. The learning media validators consisted of 3 experts, 1 material expert, 1 language expert, and 1 media expert. The experts of the learning media validators are lecturers from Padang State University (UNP). Meanwhile, FGD participants were 9 elementary school teachers (fourth grade teachers who were representatives of each elementary school). The object of this research is learning media in the form of animated video-based Indonesian language learning media using the Adobe after Effect application in grade IV elementary school.

The data collection methods used in this study were observation sheets, interview questionnaires and validation instruments. The instrument used in the validation of learning media is a validation sheet to see the validity of the learning media developed. The learning media validation sheet consists of material validation, language validation, and media validation. The material validation instrument contains the suitability of the learning media developed with learning materials that have been adapted to the curriculum. The language validation instrument contains the linguistic aspects of the learning media developed to be easily understood by students. The media validation instrument consists of the learning media design that has been developed, which includes the suitability of the use of letters, layouts, images, and colors used in learning media. The measurement scale uses a 5 (five) scale, namely, 5 = very good, 4 = good, 3 = sufficient, 2 = less good, and 1 = very poor.

This learning media development research uses qualitative and quantitative analysis methods. This qualitative descriptive analysis method is used to

analyze and process data from the review results of learning media validators and FGD participants in the form of responses, criticisms and input suggestions given to learning media. Quantitative descriptive analysis is used to process data obtained from validity instruments in the form of data in the form of numbers or scores. Furthermore, the scores obtained for each aspect of the assessment will be summed up and calculated the average. The average score of the validation results will be obtained from the total score of the validation results divided by the number of aspects assessed, using the formula (Sastradika et al., 2021) as follows:

Percentage = number of answer scores for each item/ number of aspects assessed X 100% to determine the presentation of the validation assessment, researchers used the following formula: (Total Score)/ (Maximum Score) × 100% = final percentage result.

Table 1. Category of Validation Test Results Category of Validation Test Results

Interva	Category	Description
81-100%	Very Valid	Very valid no revision needed
61-80%	Valid	Valid Needs minor revision
41-60%	Fairly Valid	Fairly valid can be used with moderate revision
21-40%	Less Valid	Needs major revision
1-20%	Not valid	Cannot be used

Result and Discussion

Define Stage

This study employed a Research and Development (R&D) approach to produce and validate animated video-based Indonesian language learning media using Adobe after Effects for fourth-grade elementary school students. The development procedure followed the 4D model consisting of Define, Design, and Develop stages, while the Disseminate stage was not implemented due to research scope limitations.

The Define phase was conducted to identify specific instructional problems and determine development objectives based on empirical field data. Observations conducted at SDN 28 Padang Sarai, SDN 35 Padang Sarai, and SDN 27 Anak Air indicated that available LCD projector facilities had not been optimally utilized and teachers predominantly relied on static textbook images in teaching folklore materials. A needs analysis was conducted through observation and student questionnaires to identify learning preferences, which showed that students demonstrated higher interest in visual and animated learning media. Analysis of learner characteristics indicated that fourth-grade students are in the concrete operational stage of cognitive development, requiring contextual and visual learning

support. Based on curriculum analysis, the selected instructional focus was understanding character traits in fictional texts, and the development objective was directed toward improving students' motivation and comprehension of characters in folklore learning.

The Design phase focused on producing the product blueprint and evaluation instruments. This stage included storyboard development, animation flow planning, script preparation, visualization of characters, alignment of learning objectives with curriculum outcomes, and preparation of expert validation instruments covering media, material, and language aspects.

The Develop phase involved product production using Adobe After Effects, expert validation, revision, and limited feasibility testing. The developed media was evaluated by media experts, material experts, and linguists to assess content accuracy, language appropriateness, visual quality, and instructional suitability. A Focus Group Discussion (FGD) with elementary school teachers functioned as an initial field trial to evaluate usability, clarity of presentation, and instructional feasibility. Revisions were conducted based on expert and practitioner feedback. The overall development procedure is presented in a structured research flow diagram to ensure methodological transparency.

Table 2. Learning Media Validation Results

Validator	Validation score	Category
Media Expert	88%	Very Valid
Material Expert	94%	Very Valid
Language Expert	90%	Validvalid

From the results of the validation test of the three validators above, an average score of 90.6 was obtained which was included in the very valid category. Overall, the validation test of Indonesian learning media based on animated videos using Adobe After Effect applications in grade IV SD is in the very valid range. The following is a display of animated video-based learning media using the Adobe Ater Effect application.

Figure 2. Animated story display

This dark and minimalist style is typically used to reinforce the dramatic impression of Malin Kundang, a legend about a disobedient son who turned into stone. The title's appearance gives a serious and emotional opening atmosphere, in line with the story's theme.

The image in Figure 3 shows the two main characters in the story: a mother standing in front of a wooden house carrying a bowl of food and smiling warmly, and a little boy standing near the stairs of the house carrying a small basket. This illustration depicts the warm relationship between mother and child in their simple life, while also introducing the initial characters in the story before the conflict takes place.

Figure 3. Characters in the story

Figure 4 shows the scene when the child character asks his mother for permission to leave home and go to the city. In this illustration, the mother is seen standing on the beach near a wooden boat, while the child is wearing simple clothes and standing facing her. The beach setting with boats, coconut trees, and the expanse of the sea reinforces the atmosphere of departure. This scene depicts an important moment in the story, namely the child's decision to leave his hometown in search of a better life.

Figure 4. Showing the child asking his mother for permission

Discussion
Focus Group Discussion (FGD)

This FGD stage was carried out to provide teachers with an understanding of the learning media that had been designed and to validate the learning media. This activity was carried out in one of the elementary schools, namely SDN 28 Padang Sarai, which was attended by 9 teachers as participants and researchers as presenters. In the FGD, it was discussed regarding the operational use of learning media that had been designed to be used in learning. At the end of the lesson, a validation questionnaire was distributed to 9 teachers who participated in the FGD. Validation was carried out on four aspects, namely material aspects, linguistic aspects, presentation aspects and graphical aspects.

From the results of the FGD test on the aspects above, an average score of 90.69 was obtained which was in the very valid category. Overall, the validation test of Indonesian language learning media based on animated videos using Adobe after Effect applications is in the range of very valid categories.

Conclusion

Based on expert validation results and limited field testing through a Focus Group Discussion (FGD), the animated video-based learning media developed using Adobe after Effects demonstrates a very high level of validity and feasibility for instructional use. The empirical findings confirm that the product meets technical, pedagogical, and linguistic standards, including content accuracy, language clarity, visual quality, and alignment with curriculum objectives. Practitioner feedback further indicates that the media is practical and effective in supporting students' motivation, attention, and engagement in learning, particularly in understanding character traits in folklore texts. These findings are consistent with previous empirical studies reporting that animation-based instructional media enhances learning interest, conceptual understanding, active participation, and learning outcomes. Therefore, the developed media represents a pedagogically sound and empirically supported instructional alternative for elementary language learning and is recommended for classroom implementation.

Author Contributions
Conceptualization and methodology, H. L. B.; software, validation, formal analysis, and investigation, H. L. B. and A.; data curation, H. L. B. and A.; writing—original draft preparation, H. L. B., A. and R.; writing—review and editing, R.

References

Agboola, A., & Tsai, K. C. (2012). Bring Character Education into Classroom. *European Journal of Educational Research*, *1*(2), 163–170. https://doi.org/10.12973/eu-jer.1.2.163

Aghni, R. I. (2018). Fungsi Dan Jenis Media Pembelajaran Dalam Pembelajaran Akuntansi. *Jurnal Pendidikan Akuntansi Indonesia*, *16*(1). https://doi.org/10.21831/jpai.v16i1.20173

Alhakiki, A., & Taufina, T. (2020). Pengaruh Quantum Teaching Kerangka Tandur Terhadap Hasil Belajar Matematika di Sekolah Dasar. *Jurnal Basicedu*, *4*(3), 534–540. https://doi.org/10.31004/basicedu.v4i3.395

Ariani, N. K., & Ujianti, P. R. (2021). Media Video Animasi untuk Meningkatkan Listening Skill Anak Usia Dini. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *9*(1), 43. https://doi.org/10.23887/paud.v9i1.35690

Asnur, L., Taali, & Desky, A. H. A. (2025). Development of Canva Software-Based Interactive Learning Media Using the ADDIE Method. *Jurnal Penelitian Pendidikan IPA*, *11*(3), 650–659. https://doi.org/10.29303/jppipa.v11i3.10425

Astuti, R., Nisak, N. maslikhatun, Nadlif, A., & Wulan Hajjatul Zamzania, A. (2021). Animated video as a Media for Learning Science in Elementary School. *Journal of Physics: Conference Series*, *1779*(1), 012051. https://doi.org/10.1088/1742-6596/1779/1/012051

Bilqis, N., Sunanih, Jayanti, D., Robiyalloh, O., Muzzammil, F., Deviyani, A., Pua'dah, M. H. K., Rimadani, S. H., Agustin, T. S., Pitriani, E., Amelia, L., Meilani, R. N., & Delia, K. (2025). Pentingnya Media Pembelajaran untuk Meningkatkan Minat Belajar di SDN 1 Pasirbatang. *Jurnal Nakula : Pusat Ilmu Pendidikan, Bahasa Dan Ilmu Sosial*, *3*(2), 10–20. https://doi.org/10.61132/nakula.v3i2.1584

Bulkani, Fatchurahman, M., Adella, H., & Andi Setiawan, M. (2022). Development of animation learning media based on local wisdom to improve student learning outcomes in elementary schools. *International Journal of Instruction*, *15*(1), 55–72. https://doi.org/10.29333/iji.2022.1514a

Cholilah, M., Tatuwo, A. G. P., Komariah, & Rosdiana, S. P. (2023). Pengembangan Kurikulum Merdeka Dalam Satuan Pendidikan Serta Implementasi Kurikulum Merdeka Pada Pembelajaran Abad 21.

Sanskara Pendidikan Dan Pengajaran, *1*(02), 56–67. https://doi.org/10.58812/spp.v1i02.110

Dermawan, & Fahmi, R. (2020). Pengembangan E-Modul Berbasis Web Pada Mata Pelajaran Pembuatan Busana Industri. *Urnal Pedagogi Dan Pembelajaran*, *3*(3), 508–515. https://doi.org/10.23887/jp2.v3i3.29123

Desky, A. H. A., Ganefri, G., Yulastri, A., Ta'ali, T., Effendi, H., & Fiandra, Y. A. (2025). Entrepreneurship-Based School Management Model to Increase Entrepreneurial Interest of Vocational Education Students at SMK Negeri 5 Padang. *Al Qalam: Jurnal Ilmiah Keagamaan Dan Kemasyarakatan*, *19*(1), 297. https://doi.org/10.35931/aq.v19i1.4306

Desky, A. H. A., Taali, Effendi, H., & Maksum, H. (2025). Development of Project Based Learning E-Modules on Android Based Embedded System Subjects. *Jurnal Penelitian Pendidikan IPA*, *11*(10), 362–371. https://doi.org/10.29303/jppipa.v11i10.12358

Deviana, B., Zen, Z., Rayendra, J, F. Y., Mirshad, E., & Desky, A. H. A. (2025). Development of E-modules Based on Quantum Learning in Projek IPAS for Class X Vocational High School. *Jurnal Penelitian Pendidikan IPA*, *11*(9), 583–591. https://doi.org/10.29303/jppipa.v11i9.12179

Ermawalis, J, F. Y., Darmansyah, Rayendra, Mirshad, E., & Desky, A. H. A. (2025). Media in Improving Teachers Professional Competence at SMAN 5 Batam. *Jurnal Penelitian Pendidikan IPA*, *11*(9), 592–598. https://doi.org/10.29303/jppipa.v11i9.12180

Fernando, Y., Andriani, P., & Syam, H. (2024). Pentingnya Motivasi Belajar Dalam Meningkatkan Hasil Belajar Siswa. *ALFIHRIS: Jurnal Inspirasi Pendidikan*, *2*(3), 61–68. https://doi.org/10.59246/alfihris.v2i3.843

Fiona, Darmansyah, Zen, Z., J, F. Y., Mirshad, E., & Desky, A. H. A. (2025). The Effect of Applying the Archerys ID Model Instructional Design and Learning Motivation on Physics Learning Outcomes at SMAN 4 Batam. *Jurnal Penelitian Pendidikan IPA*, *11*(9), 609–619. https://doi.org/10.29303/jppipa.v11i9.12181

Hanif, M. (2020). The development and effectiveness of motion graphic animation videos to improve primary school students' sciences learning outcomes. *International Journal of Instruction*, *13*(4), 247–266. https://doi.org/10.29333/iji.2020.13416a

Juniati, G. A. P. E., Putrayasa, I. B., & Margunayasa, I. G. (2023). Pengembangan Bahan Ajar Digital Berorientasi Wana Kerthi Loka Bali Pada Pembelajaran Ipas Kelas Iv Sekolah Dasar. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, *7*(1), 94–106. https://doi.org/10.23887/jurnal_pendas.v7i1.201

8

Landong, A., & Rangkuti, Y. M. (2024). Validity of Adobe After Effect Assisted Learning Media Based on Realistic Mathematics Education for Primary Schools in Medan. *AL-ISHLAH: Jurnal Pendidikan*, *16*(3), 4058–4069. https://doi.org/10.35445/alishlah.v16i3.4711

Lestari, P. A. R., & Setiawan, I. K. (2019). Adaptasi Cerita Rakyat Jayaprana Dan Layonsari Dalam Bentuk Animasi 2D. *Jurnal Nawala Visual*, *1*(2), 88–94. https://doi.org/10.35886/nawalavisual.v1i2.30

Lubis, J. W., & Masniladevi, M. (2020). Pengembangan LKPD Kecepatan dan Debit Berbasis Lectora Inspire Terhadap Berpikir Kritis di Sekolah Dasar. *Jurnal Pendidikan Tambusai*, *4*(3), 2978. Retrieved from https://www.jptam.org/index.php/jptam/article/view/799

Ningsih, W., Darmansyah, Zen, Z., Yeni J, F., Mirshad, E., & Desky, A. H. A. (2025). The Effect of the Application of BSCS 5E Instructional Design on Communication Skills and Student Learning Outcomes in Physics Subjects at SMAN 16 Batam. *Jurnal Penelitian Pendidikan IPA*, *11*(10), 372–381. https://doi.org/10.29303/jppipa.v11i10.12183

Pitriani, R., & Saputra, E. R. (2021). Pengembangan Media Pembelajaran Matematika Menggunakan Vidio Animasi di SD Kelas Awal. *Jurnal Ilmiah Wahana Pendidikan*, *7*(6), 208. https://doi.org/10.5281/zenodo.5575807

Rahayu, N. D., Zulherman, & Yatri, I. (2021). Animated Video Media Based on Adobe After Effects (AEF) Application: An Empirical Study for Elementary School Students. *Journal of Physics: Conference Series*, *1783*, 012116. https://doi.org/10.1088/1742-6596/1783/1/012116

Sudianti, N., J, F. Y., Zen, Z., Darmansyah, Mirshad, E., & Desky, A. H. A. (2025). The Effectiveness of Using Chemistry Literacy-Based Learning Videos on the Problem-Solving Ability of Grade X Students at SMA Negeri 16 Batam. *Jurnal Penelitian Pendidikan IPA*, *11*(10), 382–388. https://doi.org/10.29303/jppipa.v11i10.12182

Syamsu, F. D. (2017). Pengembangan Lks Biologi Berbasis Kontekstual Dilengkapi Dengan Mind Map Pada Materi Archaebacteria Dan Eubacteria Untuk Siswa Sma. *Jurnal Bionatural*, *4*(1), 26–34. Retrieved from https://shorturl.at/LSahn

Yelianti, U., Muswita, M., & Sanjaya, M. E. (2018). Development of Electronic Learning Media Based 3D Pageflip on Subject Matter of Photosynthetis in Plant Physiology Course. *Biodik*, *4*(2), 121–134. https://doi.org/10.22437/bio.v4i2.5858

Yulirismayenti, Irfan, D., Wahyuni, T. S., Refdinal, Hadi, A., & Desky, A. H. A. (2025). The Effect of Gamification in Computer Science Learning on Student Motivation and Learning Outcomes at SMP Negeri 27 Padang. *Jurnal Penelitian Pendidikan IPA*, *11*(9), 957–966. https://doi.org/10.29303/jppipa.v11i9.12543