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# Developing "SiGaya" Web-Based Interactive Learning Media Using Google Sites : Effect on Motivation and Science Learning Outcome in Primary Education

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**Abstract:** This study aims to develop a web-based interactive learning media called "SiGaya" using Google Sites to enhance elementary school students' motivation and learning outcomes in science. The research employed a Research and Development (R&D) method using the ADDIE model, which consists of Analysis, Design, Development, Implementation, and Evaluation stages. The SiGaya media was designed with interactive features such as videos, quizzes, and games to support engaging and effective learning experiences. The participants consisted of 25 fourth-grade students from an elementary school in Semarang, Indonesia. Data were collected through observations, interviews, questionnaires, and achievement tests. The data were analyzed using descriptive quantitative analysis, descriptive qualitative analysis, and inferential statistics. The results show that the content expert validation of the SiGaya media achieved a score of 94%, categorized as very good. Meanwhile, the media expert validation obtained a score of 88%, which is also categorized as very good. Furthermore, the effectiveness test revealed an N-Gain score of 0.71 (71%), indicating a high level of improvement in students' learning outcomes. Statistical analysis also demonstrated a significant difference between the pretest and posttest scores ($p < 0.05$). Therefore, the findings suggest that SiGaya is a valid, practical, and effective web-based learning medium that can enhance students' motivation and learning outcomes in elementary science education. This study contributes to the integration of digital learning innovations in primary education and offers a scalable model for technology-enhanced science learning.

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## Introduction

The advancement of science and technology is developing rapidly, bringing significant impacts on various aspects, specifically in the education system. According to data from Internet World Stats in 2023, Indonesia is ranked the 7th country with the largest population connected to the internet, reaching 93.2 million in October 2023 (Trijunanto et al., 2024). With the pace of technology, the education system needs to adapt. Conventional teaching patterns have begun to be abandoned because modern educational learning methods and concepts have developed and provided quality educational success (Buchori et al., 2022). The development of technology also requires that education practitioners, from the lowest to the highest level, must be able to keep up with changes. With the adaptive nature of education practitioners on technology, it will have a positive impact on students who get the learning process optimized (Nurfatimah et al., 2022).

The problem is that technological advancements, especially in the world of education, which continue to advance, are not balanced with the potential of human resources, in this case education practitioners. Some educators still use conventional learning methods in

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delivering learning materials (Hikmawati, 2020). They think that using technology complicates things for them because they are required to update their knowledge from various sources constantly. Therefore, having human resources who are ready to serve the nation and state, who are skilled and adaptive, is a necessity (Akbar & Noviani, 2019).

The learning process using technology can be applied starting from the elementary school level. This is because elementary school education is the beginning of education for students in their educational development. Learning conditions and learning situations that take place at the elementary school level can determine students' motivation and activity to achieve good learning outcomes (Wijaya et al., 2025). This certainly affects student motivation and achievement. Therefore, an effective alternative solution to increase learning motivation is through technology-based interactive learning media (Mulyosari & Khosiyono, 2023).

At the elementary level, education plays an important role as a foundation for children's intellectual development and character, where educational technology can improve the quality of learning, especially in science learning (Hidayah et al., 2024). Science learning is one of the most difficult lessons for students. This is because science learning requires various skills in thinking, practicing, and digesting each material, especially in the current independent curriculum. So that this lesson becomes less popular with students. This problem is what causes many students to struggle with learning science. Science learning is a means that can foster and develop logical, systematic, critical, objective, and rational thinking patterns (Gumilar, 2023).

Studying science, particularly the concept of motion, is often considered difficult for fourth-grade elementary school students to understand (Emy et al., 2025). In this research, the goal is to improve the motivation and learning outcomes of fourth-grade students at SD Pangudi Luhur Santo Yusup Semarang. This is because students have difficulty understanding the complex concepts in the motion subject matter. Based on initial observations in fourth-grade at SD Pangudi Luhur Santo Yusup, the level of students' understanding of motion materials was found to be quite low. This is reflected in students' inactive responses to various questions related to the material. Interactive learning media innovations can be a potential solution to improve student motivation and learning outcomes (Syafitri & Hamdu, 2023). With such active activities, web-based learning media innovations, such as Google Sites, offer high accessibility and interactive features (Yuliani et al., 2025). This application is included in structured websites. In addition to being free and easy to create, Google Sites also has facilities for collaboration, online storage, and searchability (Salsabila & Aslam, 2022). Google Sites has various features to present interesting teaching materials that can be accessed easily.

The existence of Google Sites can help teachers develop skills in compiling learning media tailored to the needs and characteristics of the learning materials. Students can access Google Sites links using gadgets or laptops connected to the internet so that learning activities can be easily carried out anytime and anywhere. The material presented in Google Sites is not only in writing but also accompanied by supporting visualizations (Mashudi et al., 2023). However, in Indonesia, the use of information and communication technology (ICT) in elementary school learning still faces challenges, such as a lack of teacher competence and media that is unsuitable for student needs (Patandung & Panggua, 2022).

According to (Larasati & Buchori, 2024), motivation plays a role in fostering enthusiasm, enjoyment, and excitement in learning. If a person is willing and eager to do something, and if they dislike it, they will try to eliminate or avoid that feeling of dislike. This problem of learning motivation is often caused by conventional teaching methods that

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tend to be teacher-centered and have minimal interaction. Meanwhile, it is related to learning motivation and related learning outcomes. According to (Tsaaqib et al., 2022), Optimal learning outcomes are also estimated to be supported by good learning encouragement because they can provide stimulation in learning for a person. These findings are supported by (Buchori et al., 2023) research on the influence of VR-based geometry lab media on student learning achievement, which shows that interactive media can address the understanding of abstract concepts at the basic level, similar to the topic 'Style and Its Influence' on IPAS.

The problem in this study emphasizes the need for innovation in web-based learning media, such as Google Sites, which offers high accessibility and interactive features (Rosmawati et al., 2024). This research developed the "SiGaya" (Google Site with Gaya) media to overcome these shortcomings, to improve the motivation and learning outcomes of grade IV students. "SiGaya" is designed with multimedia elements (videos, quizzes) that are appropriate to the stage of cognitive development of elementary school students (concrete operations), according to Piaget (Atmarini et al., 2026). This research is needed because: (1) Filling the uneven gap in the application of ICT in elementary schools, (2) Providing practical solutions to abstract topics such as "Motion", and (3) Supporting the national education goal of creating adaptive and competitive students in the digital era (Sunarti, 2022). Thus, the development of "SiGaya" will make an empirical contribution to improving the quality of science learning in elementary schools The novelty of this study lies in integratis a web-based platform as an innovative and acesible instructional tool. Accordingly, the study aims to evaluate the validity, practically, and effectiveness of the SiGaya website in improving students' motivation and acedemic achievement, while also providing a contributive instructional amterials in a more interactive and technology-enhanced format.

## Research Method

This study employed research and development (R&D) aimed at formulating or testing theories and developing them into effective products that can be used in schools (Maydiantoro, 2020). The development research chosen used the ADDIE model concept, which stands for Analyze, Design, Develop, Implement, and Evaluate(Asmayanti et al., 2020). The research was conducted at SD Pangudi Luhur Santo Yusup with 25 fourth-grade students as participants using purposive sampling. This technique was selected because the researcher needed to understand the effectiveness of the intervention in specific groups. Therefore, subjectivity in sample selection is purposive to guarantee that the data comes from the most competent and relevant source to the phenomenon, specifically the use of SiGaya for the development of a media learning based website in IPAS to improve motivation and learning outcomes.

The initial research was to collect data obtained from in-depth interviews with related parties, in this study, namely teachers who teach IPAS learning at SD Pangudi Luhur Santo Yusup. Data was also obtained by conducting participatory observations to be able to truly reveal the case so that it can be described in detail. The research was conducted systematically by collecting, processing, and summarizing data by describing cases or analyzing data using a comprehensive description related to the use of SiGaya for the development of a media learning based website in IPAS to student in the fourth-grade elementary school.

The research procedure began with an analysis stage that included an analysis of needs, student characteristics, teaching materials, and facilities and infrastructure, which was conducted through observation, interviews, and direct observation at Pangudi Luhur Santo

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Yusup Elementary School. Next, in the design stage, tools such as SiGaya as the development media learning based website, learning modules, and product assessment instruments were determined. The development stage included the creation of materials and designs, the creation of validation questionnaires and post-test questions, and the implementation of product trials by experts and students. After that, in the implementation stage, the media was tested on a limited basis to determine user responses and obtain input for product improvement. Finally, the evaluation stage was carried out formatively and summatively to determine the weaknesses of the product and measure the effectiveness of using the website-based SiGaya in IPAS to motivate and improve the learning outcomes of fourth-grade students.

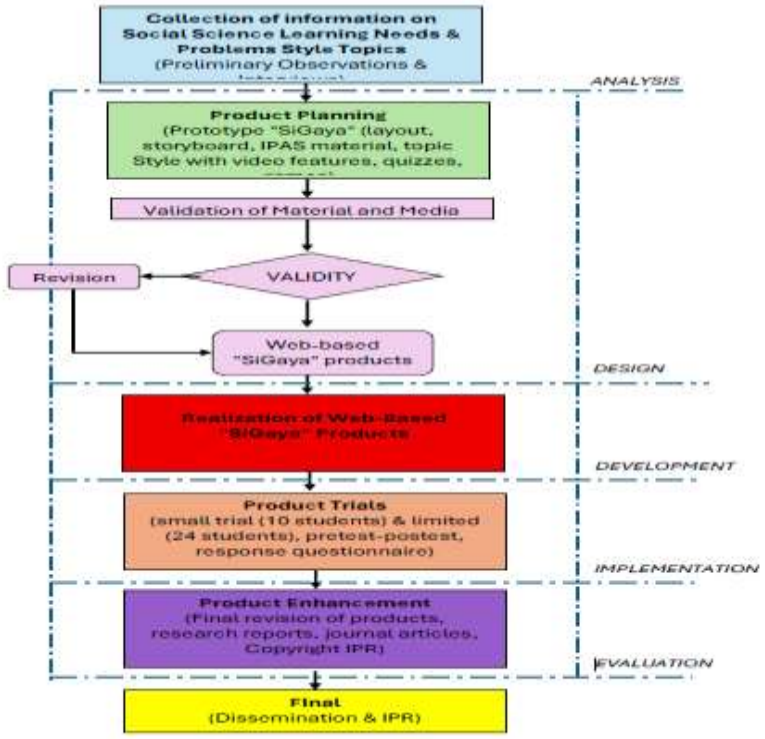


**Figure 1. Research Stages Design based on the ADDIE Model**

The following methodologies were used to validate, implement, and evaluate the data analysis techniques for the website-based SiGaya as the development media learning to enhance motivation and learning outcome in IPAS:

1) Analysis of validity. In order to validate SiGaya, each evaluated aspect, such as presentation components, content, language, relevance to motivation and learning outcome, and SiGaya suitability for learning motion material, was given a score between 1and 5 (Firnanda et al., 2025).
2) Analysis of practicality. The applicability of the website-based SiGaya is measured by student response questionnaire, teacher and practitioner response questionnaire, with instructional aspects, language aspects, and content aspects assessed(Ashadi et al., 2025)
3) Effectiveness analysis. The effectiveness analysis was conducted using student response data pretest and posttest results. Measuring the effectiveness of using normality tests on pre test and post test scores to see the significance and show the

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use of website-based SiGaya can increase motivation and effective student learning outcomes (Nafi'an et al., 2022).

## Results and Discussion

This study involved 25 fourth-grade students at SD Pangudi Luhur Santo Yusup. The development media learning SiGaya to enhance motivation and learning outcomes was carried out using the ADDIE development model, which includes the stages of Analyze, Design, Development, Implementation, and Evaluation. The first stage was the Analyze phase. The results of the analysis showed that the use of SiGaya at SD Pangudi Luhur Santo Yusup was still suboptimal, with lecture-based methods causing students to quickly become bored and lose focus. An analysis of student characteristics revealed that students tended to have low attention spans and became bored easily during lessons. Therefore, media that could capture attention and increase students' learning interest was needed. Based on these findings, a digital fun book learning media was developed, which is expected to support a more effective and engaging learning process for students. In addition, an analysis of learning objectives was conducted to ensure that the developed media could support the achievement of the intended learning goals (Mesra, 2023).

The next stage is the design stage, which shows that the tools used in website based SiGaya include laptops as hardware, Google Sites, and Canva as software. The developed material is tailored to learning outcomes and objectives, as well as the textbooks used in class. Assessment tools are also prepared to evaluate products from various aspects, and learning activities are designed in the form of learning modules integrated with media. The evaluation results of the media framework show a percentage of 88%, which falls into the "very good" category and indicates that the media is suitable for use in learning. During the development stage, the website based SiGaya design began to be realized through the creation of content based on the fourth grade IPAS textbook, background design and color palette selection using Canva, determination of relevant characters and visual elements, integration of text and images in accordance with the material, and adjustment of the file format to PNG.The development product display can be seen in Figure 2.


**Figure 2. Front View SiGaya as Media Learning**


**Figure 3. View of Every Front Page of Google Sites Learning Media**

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After the media has been successfully developed, the process continues to the product feasibility assessment stage. The feasibility of website-based SiGaya includes assessments based on: (1) subject matter experts, (2) media experts, (3) teacher practitioners and peers, (4) small group trials using questionnaires as assessment tools. The feasibility assessment results can be presented in Table 1.

**Table 1. Result for using SiGaya as media learning**

| No | Test Subject | Result (%) | Qualification |
|---|---|---|---|
| 1 | Content/Subject Expertise | 94% | Very Good |
| 2 | Media Expertise | 88% | Very Good |
| 3 | Teacher Practitioner and Peers | 90% | Very Good |
| 4 | Small group trial | 90% | Very Good |

Based on the assessment in Table 1, all subjects stated that the developed media learning was feasible, with qualifications very good. This indicates that the stages can be continued to the effectiveness test stage. Testing the effectiveness of the development of SiGaya was carried out using the test method. In collecting data on student learning outcomes before and after using SiGaya, test questions were used in the form of multiple-choice tests. Before conducting a hypothesis test (one-sample t-test), prerequisite tests were carried out, including a normality test. A summary of the t-test results for the pre-test and post-test values can be seen in Figures 4 as follows

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference Lower | Upper | | | |
| Pair 1 | Pretest - Postest | -26.848 | .997 | .199 | -27.259 | -26.436 | -134.650 | 24 | <.001 |

**Figures 4. Paired Sample Test**

Since the value of Sig. (2-tailed) is <.001, Sig. < 0.05 H0 is rejected and H1 is accepted. Meaning: There is a significant influence (real change) of SiGaya given on student motivation and learning outcomes.

**Discussion**

This study shows that the development of SiGaya media is effective in improving IPAS motivation and learning outcomes, particularly in abstract motion concept. Why?Based on the results of the development media learning SiGaya to enhance motivation and learning outcome research with the theme of motion has valid, practical, and effective criteria for use. Students demonstrated a willingness to actively engage in learning, awareness, and responsibility during the learning process, and a willingness to use tools to optimize their learning outcomes to the fullest extent. Students engaged in these three aspects by listening to and identifying the content of videos and text presentations as a form of exploration in the learning process. The elaboration stage began with completing formative and summative quizzes. Finally, in the confirmation stage, each student will share their experience using SiGaya and write a reflection on the reflective channel. This demonstrates that the Google site developed using the ADDIE model offers advantages such as engaging, flexible, and transparent visualizations as a learning medium (Sundari et al., 2024). In addition, web-based interactive media learning through Google Sites offers a range of significant benefits that can enrich students' learning experiences. One of the main advantages is improved student

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learning outcomes. Students actively participate in discussions and collaborate on assignments by accessing Google Sites (Febrian & Nasution, 2024).

This is in line with previous research conducted by (Prayudi & Anggriani, 2022) Google Sites is a suitable tool for teaching because this web-based interactive learning platform is relevant to the needs of modern education. Students can also easily access materials on Google Sites by clicking on the link provided by the teacher. As long as the page hasn't been deleted, students with the link can access it at any time. Additionally, web-based learning platforms like Google Sites offer a practical approach to education, as they can present learning materials in a more engaging way through interactive visuals (Utami, 2023).

The above research findings suggest that the use of web-based learning materials via Google Sites can effectively contribute to the learning process by motivating students to learn (Alfarizi et al., 2025). As explained by Putri et al., (2021), online learning platforms can be accessed using any device connected to the internet; they use a .com domain, making it easy to access the web pages; and they include explanations of the material, images, videos, sample questions, and practice exercises, making the material easy to understand. Therefore, it can be concluded that learning via Google Sites is a suitable learning platform. Thus, SiGaya—an interactive web-based learning platform built on Google Sites—serves as a learning tool that engages students during the teaching-and-learning process.

The results obtained from the implementation of web-based learning media to enhance student motivation and learning outcomes in IPAS instruction were achieved through SiGaya. Students' learning motivation was clearly evident when they used this learning media. This aligns with the finding that SiGaya can encourage and enhance students' willingness to learn, as well as their awareness and sense of responsibility while learning and using web-based learning media. Learning media designed to support learning activities in an interactive and enjoyable manner has proven effective in enhancing students' learning motivation (Wandani et al., 2025). This situation indicates a positive implication: if students are motivated to learn, their learning success rates can also be high through web-based learning media, and teachers' difficulties in stimulating learning motivation can be minimized (Damayanti et al., 2024).

These findings also demonstrate the positive implications of using Google Sites as a learning medium; this web-based interactive multimedia learning platform is suitable for use and highly effective in learning activities (Said et al., 2023). The positive response and improvement in student learning outcomes serve as clear evidence that web-based learning media using Google Sites are relevant, as the average post-test learning scores were higher than the average pre-test learning scores (Purba et al., 2022) Furthermore, students who were able to effectively utilize Google Sites achieved superior learning outcomes, demonstrating a positive correlation between the use of this web-based learning medium and student learning outcomes (Hidayatillah et al., 2022). A key finding from the research is that student motivation and learning outcomes in IPAS were demonstrated through the use of SiGaya as the developed interactive learning medium.

## Conclusion

This development research produced a website-based learning media called SiGaya, designed to enhance students' motivation and learning outcomes at Pangudi Luhur Santo Yusup Elementary School. The validation results indicate that the developed media is highly feasible. Expert validation of the learning content yielded an average score of 94%, categorizing the product as very feasible. Similarly, media validation resulted in an average score of 88%, which also falls within the very feasible category. These findings confirm that

the website-based SiGaya meets the validity criteria and is appropriate for use in the learning process for fourth-grade elementary school students. In terms of practicality, the implementation results demonstrate positive responses from both teachers and students. The student response questionnaire obtained a score of 85, corresponding to a 90% percentage in the very good category. Furthermore, practicality testing involving practitioners, teachers, and peer reviewers produced scores of 90 and 85, which are also categorized as very good. These results indicate that the website-based SiGaya is practical, user-friendly, and effective in supporting classroom learning activities. Overall, the findings suggest that the developed website-based SiGaya is valid, feasible, and practical, and it has strong potential to improve students' motivation and learning outcomes in fourth-grade elementary school settings.

## Recommendation

Based on the findings of the research and discussion, the researcher submitted several suggestions, including: The teachers on fourth grade are not only expected to be able to make improvements using interactive learning media, namely website-based SiGaya, but also expected to improve pedagogic skills that require teachers' ability to create learning that increases motivation and maximum learning outcomes for students. In addition, the researcher also recommends suggestions to school principals to facilitate teachers in utilizing interactive learning media and providing facilities for students to easily operate the internet with fast access, such as opening a website-based SiGaya as an innovation and learning support media. The Principal is also expected to provide enthusiasm and motivation to teachers as well as learning facilities to improve teachers' abilities.

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