

Development of Web Learning to Improve Learning Outcomes in IPAS Subject of Plant Body Parts Class IV in Elementary School

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ABSTRACT

This research aims to develop web learning to improve student learning outcomes in the Science subject matter on Plant Parts for Class IV at SDN 4 Bungbulang, Garut Regency, for the 2024-2025 academic year. The method used is the ADDIE development model, which includes the stages of analysis, design, development, implementation, and evaluation. Web learning is designed to be interactive, easily accessible, and integrated with various Google applications. The research results show that the use of Google Sites-based web learning can significantly improve student learning outcomes. Regression analysis yielded a linear equation: $\hat{Y} = 35.505 + 0.729X$. Furthermore, hypothesis testing to assess significance yielded a calculated t-value of 4.428, which is greater than the t-table value of 1.708, meaning H_0 is rejected and H_1 is accepted. This indicates that there is an influence of Google Sites-based web learning media on student learning outcomes. To see the extent of the influence of variable X, the R-squared value of 0.440 is observed, meaning that Google Sites-based web learning media has a 44.0% effect on student learning outcomes. Therefore, the Google Sites-based web learning product is suitable for use and development in learning.

Keywords: Web learning, Google Sites, Science, Learning Outcomes, ADDIE Model

INTRODUCTION

Learning outcomes are an important indicator in evaluating the effectiveness of the learning process, because it reflects the extent to which students understand and apply the material that has been taught (Bloom, 1956). In the context of 21st century education, learning outcomes are not only measured by cognitive abilities, but also include affective and psychomotor aspects that enable learners to think critically, innovate, and adapt to changing times (Triling, B., & Fadel, C., 2009).

Based on the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 8 of 2024 concerning Content Standards at the Basic Education Level, the scope of IPAS material is: the form, function of the body structure of living things, life cycles, interactions, and preservation of living things. The purpose of the Natural and Social Sciences (IPAS) curriculum in elementary school is to equip students with a comprehensive understanding of the surrounding environment, both natural and social aspects. This goal is achieved by developing curiosity, critical thinking skills, and skills in solving problems related to the environment, as well as fostering awareness of the interconnectedness between nature, humans, and society.

Social Science (Natural and Social Sciences) learning in elementary school has a strategic role in improving student learning outcomes. IPAS which combines natural and social science concepts requires students to think holistically, solve problems, and apply knowledge in daily life. Through IPAS learning, students can be invited to explore, observe phenomena, and create innovative solutions to environmental and social problems around them. However, this potential can only be optimized if learning is designed creatively and attractively (Lestari et al., 2023).

In the field, the learning outcomes of students in social studies learning in grade IV of SDN 4 Bungbulang are still relatively low. Based on initial observations on science subjects, especially plant body parts, many students tend to be passive, do not participate in discussions, and only rely on memorization without understanding

concepts in depth. This situation reflects that learning has not been able to provide space for students to think critically and apply the concept of IPAS effectively. Furthermore, based on the results of the initial test held on April 17, 2024, attended by 27 students, only 20% or as many as 7 students reached the "good" category in learning outcomes. As many as 30% or 8 students are in the "adequate" category, while the rest, namely 50% or 14 students, are in the "less" category. This figure is reinforced by observations in the classroom that show that the majority of students have difficulty understanding social studies concepts and applying them in real-life contexts.

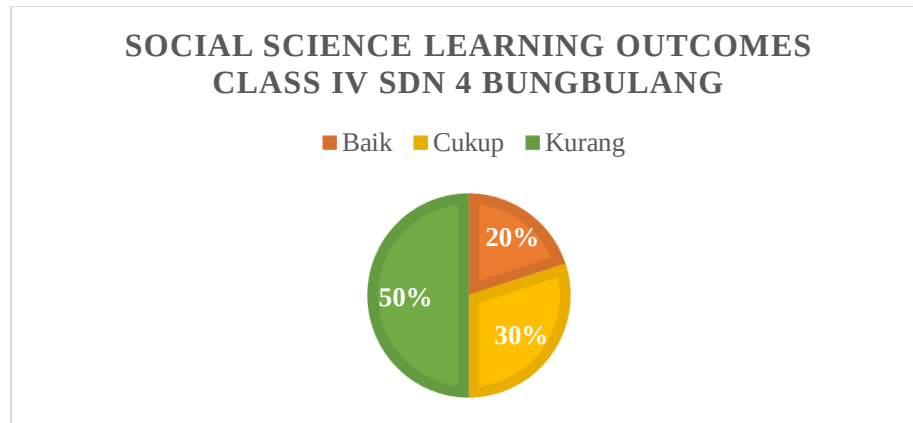


Fig. 1 Data on Learning Outcomes for Grade IV SDN 4 Bungbulang

This data shows that the learning that takes place has not fully encouraged the improvement of student learning outcomes. This needs to be addressed immediately so that social studies learning in grade IV of SDN 4 Bungbulang can provide optimal benefits in accordance with the objectives of the curriculum which emphasizes understanding concepts and the application of knowledge in daily life.

Meanwhile, the results of interviews with teachers and preliminary questionnaires showed that the low learning outcomes of students were influenced by the dominant learning approach that was still conventional. Teachers use more lecture and assignment methods, as well as learning resources that rely only on source books. According to Suyanto (2019), interactive learning creates a fun learning atmosphere and increases student creativity. Furthermore, Amalia & Lestari (2021) show that active and varied learning methods increase students' creativity and problem-solving. Meanwhile, according to Rahmayanisimbolon et al. (2024), technology-based interactive learning media increase the creativity and learning outcomes of elementary school students.

Conventional learning is one of the main causes of this problem. To overcome this, a learning approach that is more relevant to the needs of current students is needed. One of the alternative solutions that can be implemented is the use of web learning-based *Google Sites*. *Web learning based Google Sites* is a web-based learning platform designed using services *Google Sites* to support the learning process digitally. *Google Sites* allows teachers to create interactive, organized, and easily accessible learning sites for learners anytime and anywhere. With intuitive features and *User-friendly*, *Google Sites* allows the integration of various types of learning content, such as text, images, videos, documents, and interactive quizzes. This media allows teachers to present material interactively, provide easy access to additional learning resources, and engage students in engaging and meaningful learning activities (Adzkiya & Suryaman, 2021; Murtadlo & Pharisees, 2023).

In the context of learning in elementary school, *Web Learning based Google Sites* has the potential to improve student engagement and learning outcomes. With a customizable site design, teachers can create engaging learning experiences, encourage learners to explore the material independently, and provide a space for them to generate creative ideas. *Web learning based Google Sites* It also supports a project-based learning approach, where learners can access a variety of digital resources to support their learning process. This makes it possible for *Google Sites* as an innovative solution in supporting digital education that is inclusive, effective, and relevant to the needs of the times (Mukti et al., 2024)

Based on the above explanation, the researcher wants to develop *Web Learning* based *Google Sites* which can help students to improve learning outcomes. Thus, the researcher is interested in carrying out a research with the title "Development *Web Learning* to Improve Learning Outcomes in Grade IV Science Subjects in Elementary Schools".

RESEARCH METHODS

The type of research used is *Research and Development* (R&D), and the research model uses ADDIE, namely Analyze, Design, Develop, Implement and Evaluate with a quantitative approach. The sample in this study was 27 grade IV people at SDN 4 Bungbulang, Garut regency using *non-probability sampling*. Data collection techniques used by test and non-test with interviews and questionnaires,. The technical data analysis carried out in this study is quantitative descriptive analysis, with data normality test, homogeneity test, hypothesis test, acceptability test and regression test. The research steps of the researcher refer to the following research design.

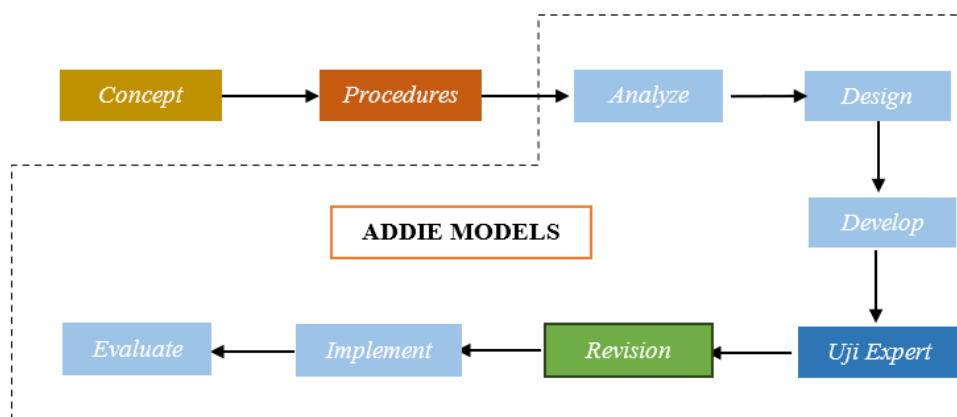


Fig. 2 Research Design with ADDIE Model

RESULTS AND DISCUSSION

Based on the findings that the researcher conducted in the research on the development of Web Learning based on *Google Sites* on the improvement of learning outcomes of grade IV students at SDN 4 bungbulang Garut, the researcher found several gaps in the learning process that occurred in the field, namely:

Based on the results of interviews conducted with grade IV teachers on December 7, 2024, it was found that teachers had difficulty in presenting Plant Body Parts material interactively. The teacher stated that the use of learning media is still limited and tends to be conventional (lectures and assignments). This is reinforced by the findings that teachers "rarely use media" and "only use media that is available in the classroom." These limitations have an impact on the lack of student involvement in the learning process. So the researcher developed by creating a Web Learning learning media based on Google Sites on the subject of Plant Body Parts class IV. In line with this, Deni Darmawan in his book "Learning Models in Schools" (2022) emphasizes the importance of using varied and interactive learning media to improve the quality of learning. He stated that, "Interactive technology-based learning has many advantages, such as increasing student motivation and making learning more interesting" (Darmawan, 2022). In addition, in a joint study with Ela Islanda, Deni Darmawan (2023) developed Google Sites-based learning media to improve student learning achievement. The results of the study show that these learning media are effective in improving student learning outcomes, with a validation score by media experts of 85.55% which is included in the "very feasible" category to use (Darmawan & Islanda, 2023). Thus, the development of Google Sites-based learning media on the subject of the Plant Body Section class IV is in line with the recommendation of Deni Darmawan (2022) to utilize technology in learning to increase student engagement and achievement.

Based on the questionnaire distributed to students, it can be seen from figure 4.2 that 82.6% of teachers rarely use social studies learning media in the classroom, this provides a high gap with some teachers 7.4% who only

use interactive learning media. As stated by Darmawan (2023), "85% of teachers in elementary schools still rarely use digital media, while the use of Google Sites has been shown to increase student engagement in learning IPAS" (p. 48). This is the basis for why researchers want to develop Google Sites-based Web Learning learning media at SDN 4 Bungbulang.

Based on the results of observations conducted by researchers at SDN 4 Bungbulang, it turns out that the infrastructure facilities are very supportive for the implementation of Google Sites-based web learning. The school has quite good internet access and some supporting facilities such as Chromebooks. As revealed by Darmawan (2021), "The availability of digital infrastructure such as computer devices and an adequate internet network is the main prerequisite for implementing technology-based learning effectively.

Therefore, the researcher developed Google Sites-based web learning as an effort to improve student learning outcomes at SDN IV Bungbulang. Darmawan (2024) in his research proves that "Schools that implement web-based learning have experienced a significant increase in student learning outcomes, with an average increase in scores of 22.5% compared to conventional methods".

Next, the researcher makes a design for the product to be developed. According to Darmawan (2023), "The design of digital learning products requires systematic preparation that includes technical and pedagogical aspects". Design includes the stages of software selection, website design, module design, flowchart creation and *storyboard preparation*. The web learning flowchat developed in this study can be seen in the following image.

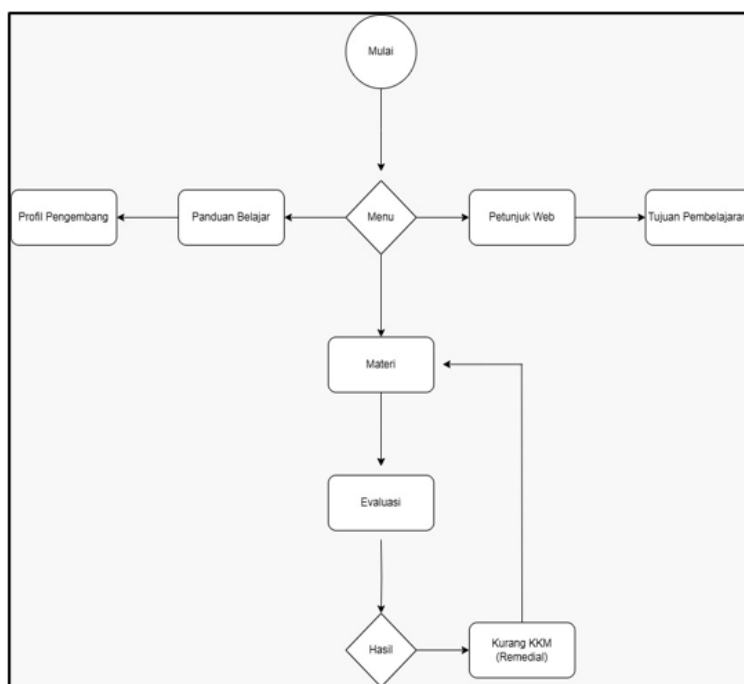
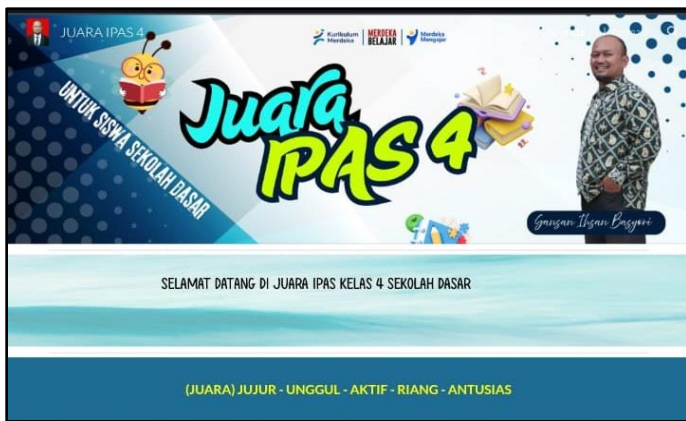


Fig. 3 Flowchart web learning

The next stage is to create a *storyboard* based on a *flowchart* that has been compiled to facilitate the web learning development process. *Storyboards* serve as detailed visual guides, describing the look and layout of each page, as well as the expected interactions in web learning. Guided by *storyboards*, the development process becomes more structured, efficient, and ensures design consistency. The developed web learning view can be seen in the following image.



Pig 4 Initial Views Web Learning



Pig. 5 Material Display on Web Learning

After the web learning is completed, the next step is to conduct an expert validation test. The vlidators involved are material experts and media experts. In this study, the media expert validator used one expert with two validations, and the material expert validator one person with two validations. The following are the results of the recap of the assessment of validators, media experts, and material experts on the products produced.

Table 1 Recap of Validation Results 1 Media Expert Validator

Yes	Media Validation Components	Validation 1									
		1	2	3	4	5	6	7	8	9	10
1	Feasibility of Display screen design							5			
2	Eligibility and ease of use								2	2	1
3	Feasibility of utilization								2	2	1
Quantity								5	4	4	2

Based on the results of validation assessment 1 from the media expert validator, the eligibility percentage is then calculated as follows:

$$Percentage = \frac{f}{N} = \frac{\sum(jawaban \times bobot \text{ tiap pilihan})}{(n \times bobot \text{ tertinggi})} \times 100\%$$

For the first validation:

$$\text{Percentage} = \frac{f}{N} = \frac{(5 \times 7) + (4 \times 8) + (2 \times 9) + (2 \times 10)}{(15 \times 10)} \times 100\%$$

$$\text{Percentage} = \frac{f}{N} = \frac{35 + 32 + 18 + 20}{150} \times 100\% = 70$$

After obtaining the percentage results from the media expert test, then the results of the percentage are converted with a five-scale achievement level conversion table. The table of feasibility conversions of scale five can be seen in the following table.

Table 2 Eligibility Percentage Criteria

Validation Value (%)	Categories
87 – 100	Very Valid/ Very Good
70 – 86	Valid/ Good
53 – 69	Quite Valid/ Quite Good
37 – 52	Invalid/Not Good.
20 – 36	Invalid/ Not Good

Based on the conversion table above, the percentage obtained from the test results of learning media experts is 70% which is in the range of 70 – 86.

Furthermore, the researcher revised the product produced, and tested the validation again with the following validation results.

Second validation:

Table 3 Recap of Validation Results of 2 Media Expert Validators

Yes	Media Validation Components	Validation 2									
		1	2	3	4	5	6	7	8	9	10
1	Feasibility of Display screen design									5	
2	Eligibility and ease of use									3	2
3	Feasibility of utilization									2	3
Quantity										10	5

The eligibility percentage is as follows.

$$\text{Percentage} = \frac{f}{N} = \frac{(10 \times 9) + (5 \times 10)}{(15 \times 10)} \times 100\%$$

$$\text{Percentage} = \frac{f}{N} = \frac{140}{150} \times 100\% = 93,33$$

Based on the conversion table above, the percentage obtained from the test results of learning media experts is 93.33% which is in the range of 87 – 100 with the category of very valid / Very Good. This means that learning media is suitable for use in the implementation of learning (implementation).

Furthermore, the results of the validation of the subject matter experts were obtained as follows.

Table 4 Recap of Validation Results 1 Material Expert Validator

Yes	Material Validation Components	Validation									
		1	2	3	4	5	6	7	8	9	10
1	Content Eligibility							2	2	1	
2	Writing Eligibility							1	4		
3	Presentation Eligibility							1	4		
Quantity								4	10	1	

The eligibility percentage is as follows.

$$\text{Percentage} = \frac{f}{N} = \frac{(4 \times 7) + (10 \times 8) + (1 \times 9)}{(15 \times 10)} \times 100\%$$

$$\text{Percentage} = \frac{f}{N} = \frac{117}{150} \times 100\% = 78\%$$

Based on the conversion table above, the percentage obtained from the test results of learning media experts is 78% which is in the range of 70-86 with the valid/good category.

Table 5 Recap of Validation Results of 2 Subject Expert Validators

Yes	Material Validation Components	Validation									
		1	2	3	4	5	6	7	8	9	10
1	Content Eligibility									5	
2	Writing Eligibility									4	1
3	Presentation Eligibility									3	2

Yes	Material Validation Components	Validation									
		1	2	3	4	5	6	7	8	9	10
	Quantity									12	3

The eligibility percentage is as follows.

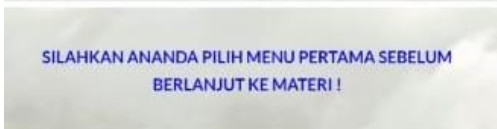
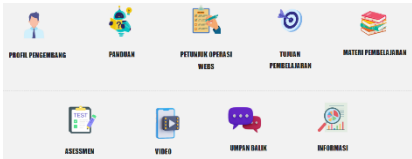
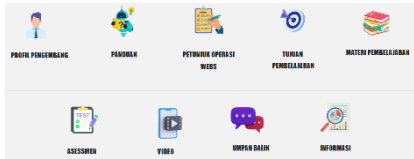
$$\text{Percentage} = \frac{f}{N} = \frac{(12 \times 9) + (3 \times 10)}{(15 \times 10)} \times 100\%$$

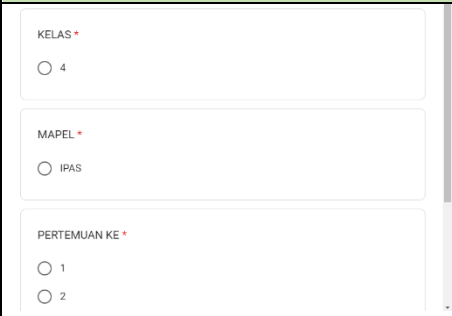
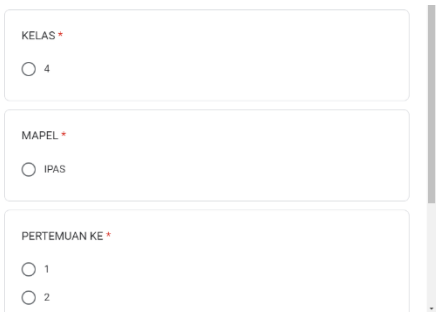
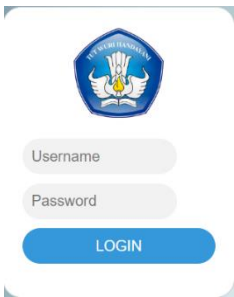
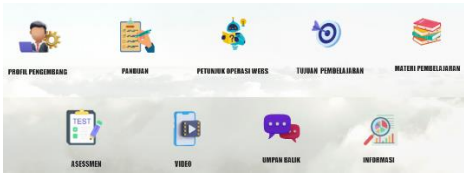
$$\text{Percentage} = \frac{f}{N} = \frac{138}{150} \times 100\% = 92\%$$

Based on the conversion table above, the percentage obtained from the test results of learning media experts is 92% which is in the range of 87-100 with the category of Very Valid / Very Good. This means that judging from the content, learning materials are suitable for use in the implementation of learning.

After the resulting product has been tested for media and material validation, the researcher revises the product according to the notes from the media and material expert validator. Here are some of the appearance changes to the product *Web Learning*.

Table 6 Product Display *Web Learning* Before and After Revision

Before Revision	After Revision from Media Expert
 Menu text (Home, Information) is poorly readable	 Menu text (Home, Information) is clearly legible
 No emphasis on menu	 No emphasis on menu Guides
 Show menus presented in plain form	 Show menus presented in animated form

Before Revision	After Revision from Media Expert
 On the subject matter menu, class points, maps, and meetings are still global	 On the subject matter menu, class points, maps, and meetings are in accordance with the scope of the research
 When you click on Assessment, Feedback, Information, When you click the home menu Return to the login page	 When you click on Assessment, Feedback, Information, When you click the home menu, you have entered the main menu
No Logout/Log Out menu	 There is already an Logout/Log Out menu

After web learning is categorized as "feasible", the next stage is to use web learning in real learning (implementation) which consists of the preparation stage and the implementation stage. At this stage of implementation, data on student learning outcomes was obtained as follows.

Table 7 Student Learning Outcomes

Learning Outcomes	Rata – Rata	Highest Score	Lowest Score
<i>Pretest</i>	63	85	40
<i>Posttest</i>	81	100	60

From the results of the average score of the *pretest* and *posttest*, there was an increase of 18%, in accordance with the initial assumption that the learning process by participating in *google* sites-based *web learning* will improve student learning outcomes on the subject of plant body parts of the Social Natural Sciences (IPAS) subject. Furthermore, the researcher conducted a test of the influence of web learning on student learning outcomes using statistics. The results of the normality test were obtained that the data was normally distributed, so that hypothesis testing could use a linear regression test. The results of data processing using SPSS version 27 are obtained as follows.

Table 8 Hypothesis Test

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	35.505	10.451	3.397	.002
	Pretest	.729	.165	.663	<.001

a. Dependent Variable: Posttest

From the results above, we can see that the value of the coefficient is positive (+), which means that the variable X, which is Google Sites-based Web Learning, has an effect on the variable Y, which is the student's learning outcome. The value (a) is the constant $a = 35.505$ and the value (b) is the coefficient, $b = 0.729$, so the regression equation is as follows.

$$\hat{Y} = a + bx = 35,505 + 0,729 x$$

To determine whether the regression coefficient is significant or not (variable x affects variable Y), the researcher conducts a hypothesis test (t-test). The researcher compared the *t*cal value with the *t*table value. The SPSS result calculation is 4.428. Next, the researcher looked for the *t*table value by looking for the *degree of freedom* (df). $df = N - 2 = 27 - 2 = 25$, then looking at the *t*table with a significance level of $5\% = 0.05$, the *t*table value was 1.708. Since the *t*cal value of 4.428 is greater than the $>$ of the *t*table value of 1.708, it can be concluded that H_0 is rejected and H_1 is accepted. The hypothesis proposed by the researcher is as follows.

H₀: There is no influence of Google Sites-based Web Learning on student learning outcomes in social studies subjects in grade IV of SDN 4 Bungbulang.

H₁: There is an influence of Google Sites-based Web Learning on student learning outcomes in social studies subjects in grade IV of SDN 4 Bungbulang

Looking at the hypothesis made by the researcher, it can be concluded that "There is an influence of google sites-based web learning (X) on student learning outcomes (Y). The calculated *t* value of 4.428 is greater than the *t* of the table 1.708.

Next, the researcher examined the results of the Model Summary table on the SPSS results to determine the magnitude of the influence of variable X on Variable Y. The guideline taken was on the value of R Square or R^2 .

Table 9 The Magnitude of Influence Web Learning on Learning Outcomes

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.663 ^a	.440	.417	9.189

a. Predictors: (Constant), Pretest
b. Dependent Variable: Posttest

Based on the data of the Model Summary table produced through the SPSS calculation above (table 4.16), the researcher concluded that "Teachers' creativity in utilizing google sites-based web learning (X) on student learning outcomes (Y) with a total influence of 44.0%, while 56.0% by other variables that were not studied.

CONCLUSION

Based on the results of research and discussion on the development of Google Sites-based Web Learning in improving student learning outcomes in this science subject, the development of this ADDIE-based product resulted in the following conclusions.

1. Analysis of the need for *Google Sites-based Web Learning* in the subject of IPAS plant body material includes the analysis of primary data and secondary data.
2. *Google sites-based web learning design* in the subject of IPAS plant body material starts from collecting information or data, making designs (selecting and assigning *software*, creating *website* designs, creating learning flows, making *storyboards*, and creating teacher and student guide modules, as well as making *flowcharts* learning with Google Sites-based web learning).
3. Develop. Before *Google sites-based Web learning* in the subject of IPAS plant body parts is used by the user, it is necessary to test the validity of material and media experts.
4. The implementation of *google sites-based web learning media* in the subject of IPAS plant body material is carried out at the implementation stage and the finished product is used for the learning process.
5. *Evaluate google sites-based web learning* in the subject of IPAS plant body parts aims to find out feedback about the products that have been developed. The products produced are: <https://sites.google.com/guru.sd.belajar.id/juaraipas4/beranda>
6. The development of *google sites-based web learning learning media* in the subject of IPAS plant body material can have an effect in improving student learning outcomes. Based on the results and discussions described, it can be concluded that *Google Sites (X)-based Web Learning* has an effect on learning outcomes (Y) with a total influence of 44.0%.

RECOMMENDATIONS

Based on the results of the analysis and conclusions, the researcher provides the following recommendations:

1. Research on the development of *Google Sites-based Web Learning* learning media has a positive impact and improvements in learning. For this reason, the researcher hopes that schools (SD) will develop similar research that can make a positive contribution and support in the success of learning.
2. Research on the development of *google sites-based web learning media* on the subject of plant body parts in science subjects at SDN 4 Bungbulang can improve student learning outcomes. For this reason, teachers who carry out learning on similar subjects or in other subjects should use web learning in their learning.
3. In connection with this study, it focuses more on *google sites-based web learning learning media*, so the researcher suggests that other researchers can conduct research that focuses on *the web learning* model. The researcher also hopes that in future research, other researchers can conduct follow-up research on other subjects.

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