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The Development of Inquiry-Oriented Google Sites Learning Media to Improve Students' Science Process Skills

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ABSTRACT

This research aims to develop Google Sites learning media that is oriented to inquiry learning and is used to improve science process skills in students. The research method used is R&D, or development. The research model applied is the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model. The validation results obtained from media experts show that the percentage of 97.5% is very valid. The assessment by the material expert validators shows a percentage of 97.5%, which is very valid. Meanwhile, the assessment by linguist validators shows a percentage of 100% or very valid. This means that the media is worth using because it can attract interest, make it easier to understand the material and be linguistically clear. Practicality comes from student questionnaires of 89% which can be categorized as very practical or in accordance with the learning needs of students in the classroom. Measuring effectiveness was carried out by comparing the scores obtained from student observations based on 14 indicators of science process skills increased by 48%, or included in the effective category so that it was effectively used to improve student skills. Based on this description, it shows that Google Sites learning media that is oriented to inquiry learning is valid because it meets the criteria in terms of media, material and language, practical because it can make it easier for students to acquire knowledge actively, fun and high interest in learning, and effective because it affects the improvement of science process skills in students.

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1. INTRODUCTION

Education plays a crucial role in forming a generation with 21st-century skills, including at the tertiary level. These skills are often referred to as the 6Cs, which include character, citizenship, critical thinking, communication, creativity and innovation, and collaboration (Husna, 2022). The role of educators is very much needed in education as an effort to create students who are able to have the skills needed to face the environment (Supit et al., 2023). Educators, including lecturers, act as facilitators, motivators, and inspirers, so they must be able to integrate technology into learning to encourage students' mastery of skills.

The Primary School Teacher Education Study Program at Sriwijaya University is now implementing the 2021 Curriculum. One of the courses in this curriculum is Elementary Science Learning. This course not only focuses on students' ability to master knowledge such as facts, concepts, or principles, but is also oriented towards research and action to help students better understand the natural environment. Elementary science learning should provide direct learning experiences for students to be able to logically and scientifically understand learning that is closely related to the environment to foster students' cognitive, psychomotor, and social skills. One of the skills emphasized in elementary science learning is science process skills, which involve activities that are directly related to the science process in the form of observation, understanding processes, data processing, and others in learning related to the environment (Nur, 2022). The needs arising from this situation are that students need learning activities that are able to create an interesting, enjoyable learning atmosphere and apply science process skills by involving learning models that are oriented towards supporting learning in the form of learning media to increase interest in implementing science process skills. In accordance with the opinion expressed by Choiru and Wisanti (2023), fun and interactive learning experiences can increase students' interest, motivation, and involvement in actively forming their knowledge, especially things related to science process skills.

Based on preliminary studies that have been carried out by reseachers, facts in the field show that students who take elementary science learning courses are still at the lower middle level or have just reached the "good" category. The reason this happens is because often elementary school science learning courses are only carried out with activities presentations without involving elements related to scientific activities in learning, learning activities run monotonously and repetitively without any variation, causing students to feel bored. The references used in learning activities are also less diverse, so many students only rely on Google for support in supplying their learning material needs. In accordance with existing problems, one solution that can be implemented is to motivate students to be active in learning activities and facilitate the development of science process skills using interactive multimedia, which is structured based on the syntax of a learning model that can support students in implementing science process skills, namely the inquiry learning model. Which is oriented towards website-based learning media, which in this case was developed through Google Sites.

Previous research (Waraga et al., 2023) produced a product, namely the development of Google Sites-Assisted Learning Devices on Vibrations and Waves Material. The conclusion from the results of this research is that the resulting Google Sites media is valid and practical to use. However, the impact on the research subjects, namely students, is not yet known and has not been measured. Apart from that, increasing science process skills before and after learning has not been focused on. Therefore, in this research, inquiry-learning-oriented Google Sites learning media was developed to improve students' science process skills. Researchers will test the validity, practicality, effectiveness, and improvement of students'

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science process skills after receiving treatment using Google Sites learning media, which is oriented towards inquiry learning. It is hoped that the results of this research will be able to help in the learning process and improve students' science skills.

2. METHODS

This study is a type of research and development (R&D) research or development using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) method. The research subjects were students in the fourth semester of Primary School Teacher Education FKIP Sriwijaya University who took the Elementary Science Learning course. The data collection techniques used by researchers are: 1) observation to collect data on needs analysis; 2) validation sheet to measure the level of feasibility; 3) response sheet for students to measure practicality; and 4) observation sheet to measure the level of product effectiveness. The data analysis techniques used in this research are: 1) qualitative descriptive analysis to group data in the form of suggestions given by expert validators and product trials; 2) quantitative descriptive analysis to manage data in the form of percentages and see comparisons before and after the subject is subjected to treatment. Research stages are described in **Figure 1**.

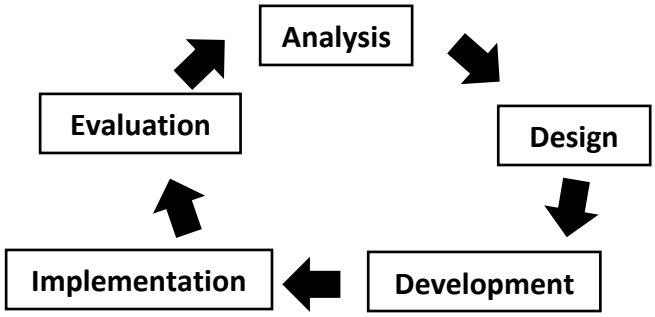

Figure 1. ADDIE Method.

3. RESULTS AND DISCUSSION

Results of research into the development of Google Sites learning media products which, went through the following 5 stages:

3.1. Analysis

At this stage, the researcher carried out a needs analysis, which was carried out by observing learning activities at the beginning of the semester using an observation assessment sheet that was based on 14 indicators of science process skills (Aditiyas & Kuswanto, 2023) existing in students and finding solutions to the learning process in class in the form of a learning process that still uses conventional models, does not use learning media as a means of supporting learning, and lacks science process skills in classroom learning. Based on research conducted by Kristina et al (2023), learning that does not use the right model will result in less than optimal absorption of knowledge and skills for students. In line with this statement, learning with a conventional model without any tools that can support learning activities will create a learning atmosphere that is not varied and boring for students, so that students will become passive (Hidayatullah et al., 2022). Student activity should be one of the important requirements in learning activities because the level of student activity will

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influence the development of their skills. In this case, the process of developing science process skills will be disrupted if students are passive in the classroom (Rizkianida et al., 2023).

The findings from the observation activities carried out are that the science process skills possessed by students are still in the lower middle category or only at the "good" level. This is because the learning atmosphere created in the classroom is monotonous and only through presentation activities without any variation, so that causes a feeling of boredom. Research from Choiru and Wisanti (2023) explains that to deal with various situations in the environment, scientific process skills are needed in students because they are important for interaction and adaptation in the living environment in the future, so it will be a problem if students master the existing skills. just at an ordinary level. Problems that arise in the science process skills possessed by students are related to the learning models and media used in learning. Changes need to be made to create a generation that has science process skills in the Sriwijaya University FKIP Primary School Teacher Education study program. Students' science process skills that are at a high level will be able to influence students' lives in dealing with various situations in the surrounding environment. Sari (2019) explains that, apart from academic needs, science process skills can be used as a means of solving problems in the surrounding environment, which cannot be separated from the scientific process.

Satisfactory changes in improving students' skills can be influenced by learning media that are oriented towards appropriate learning models that are appropriate to the learning process, as explained by research results from Ranti & Kurino (2023) that the science process skills possessed by students can be trained by using web-based learning media that is packaged based on a learning model that actively involves students in direct contact with learning material such as inquiry learning. Learning activities with websites can be facilitated with Google Sites products because they are easier to use and can be integrated and organized based on needs for the development of students' science process skills.

3.2. Design

This stage is where the researcher creates a design that is tailored to the needs of the research subject in learning activities. The design is created based on the analysis that has been carried out to maximize non-maximum parts and those that need to be improved, or on the focus of problems faced by students in learning activities, namely activities. Monotonous learning and not using learning media as support or tools that can help in the process of understanding the material. At this stage, the researcher carried out activities to present material and create storyboards. As research conducted by Wijaya et al*.,* (2022) shows, the design of interesting stages has the function of developing students' interest; apart from that, collecting materials is also needed for media development, making storyboards, and making.

3.3. Development

This stage is the stage of developing or creating learning media, and then it will be validated by media, material, and language expert validators. This is in accordance with research conducted by Rosvita and Anugraheni (2021) which stated that the development stages were carried out to determine the validity of the product, which was tested by experts in media, materials, and language. The level of product practicality is obtained from student responses to questionnaires after using the product. The results of product development can be seen in **Figure 2-6**.

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Figure 2. The wireframe page has a button to the main menu page.

Figure 3. The main menu page has eight menus that can be accessed at each meeting and one constituent information menu.

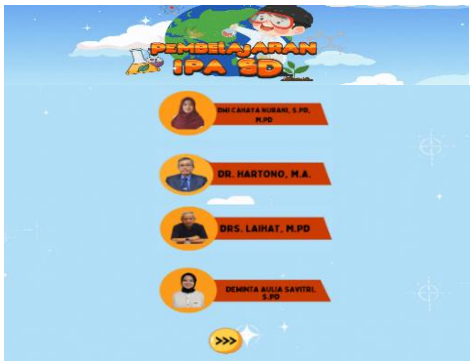

Figure 4. Information page for composing learning media.

Figure 5. Page on the scope and nature of elementary science learning.

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Figure 6. Per-topic menu page in each meeting equipped with discussion forums and assignments.

Before learning media is used, a feasibility or validity test must be carried out in product development. The level of product validity is assessed using the media expert and material expert instrument data sheets that have been processed by the researcher. The percentage of validity of learning media can be seen in **Table 1-3**.

The percentage of validity of learning media can be seen in **Table 1**.

Table 1. Media Expert Validation Sheet Score Results.

No	Assessment Aspects	Number of Statements	Earning Score	Max Score	Percentage (%)	Category
1	Symbol System	6	24	24	100	Highly Valid
2	Technology Perspectives	2	7	8	87,5	Highly Valid
3	Processing Capabilities	2	8	8	100	Highly Valid
	Sum		39	40	97,5	Highly Valid

According to the assessment carried out by media validators, grades are given based on several aspects. The symbol system aspect received a score of 24 with a percentage of 100%, which can be categorized as very valid. This shows that the media being developed has a clear and appropriate symbol system. The assessment of the technological perspective aspect of learning media received a score of 7 with a percentage of 87.5%, which can also be classified as very valid. From this assessment, it can be concluded that the learning media developed can help students in learning activities. Then, in terms of learning media processing capabilities, the Google Sites-based system developed by researchers received a score of 8 with a percentage of 100%, included in the very valid category. From these results, it is concluded that the learning media developed can be used smoothly and efficiently.

The percentage of validity of learning materials can be seen in **Table 2**.

Table 2. Material Expert Validation Sheet Score Results.

No	Assessment Aspects	Number of Statements	Earning Score	Max Score	Percentage (%)	Category
1	Curriculum	4	16	16	100	Highly Valid
2	Characteristics of Inquiry Learning	4	15	16	93	Highly Valid
3	Material	2	8	8	100	Highly Valid
	Sum		46	48	97,5	Highly Valid

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According to the assessment by the validator, the assessment is given based on several aspects. The curriculum aspect received a score of 16 with a percentage of 100%, indicating a very valid category. From this assessment, it can be concluded that the material created is in accordance with the applicable curriculum. Meanwhile, in the aspect of inquiry learning characteristics of learning media, the validator's assessment gave a score of 15 with a percentage of 93%, also in the very valid category. From the results of this evaluation, researchers can conclude that the learning materials created can help students in learning activities, especially in terms of suitability to the learning flow. In the Google Sites-based learning media material aspect, the research received a score of 8 with a percentage of 100%, also included in the very valid category. From this, it can be concluded that the learning materials created can be used comprehensively to meet learning needs.

The percentage of language validity can be seen in **Table 3**.

Table 3. Language Expert Validation Sheet Score Results.

No	Assessment Aspects	Number of Statements	Earning Score	Max Score	Percentage (%)	Category
1	Clarity Language	2	8	8	100	Highly Valid
2	Norm	2	8	8	100	Highly Valid
3	Words and Terms	1	4	4	100	Highly Valid
	Sum		20	20	100	Sangat Valid

According to the assessment by the validator, the assessment is given based on several aspects. The language clarity aspect received a score of 8 with a percentage of 100%, indicating a very valid category. From this assessment, it can be concluded that the language used is very clear and does not make it difficult for students to participate in learning activities. Meanwhile, in the aspect of linguistic rules, the validator's assessment gave a score of 8 with a percentage of 100%, also in the very valid category. From the results of this assessment, it can be seen that the linguistic rules presented in the learning media are in accordance with the rules. In terms of words and terms, the research received a score of 8 with a percentage of 100%, also included in the very valid category. From this, it can be inferred that the words and terms used in Google Sites learning media comply with applicable regulations and can be well understood by students or users.

3.4. Implementation

This stage is carried out by conducting product trials on students through three stages, namely one-on-one with 1 student and a small group with 14 students. The percentage of practicality of learning media can be seen in **Table 4**.

Table 4. Media Practicality Presentation.

Procurement Components	Precentage
One to one trial	86%
Small group trial	93%
Sum	89%

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Processing practicality data obtained from student response questionnaires shows that the percentage of practicality of the 3 indicators contained in the student response questionnaire at the one-to-one and small group trial stages was obtained at 89%, or included in the very practical category. Based on this, Google Sites learning media is inquiry-oriented in its use, which is very practical.

3.5. Evaluation

This stage has basically been carried out from the beginning of the research process, especially at the design, development, and implementation stages. Evaluation is used to correct deficiencies in the product and then use it as learning to progress towards a better and more perfect product. In accordance with the opinion expressed by Hanafi (2017), product makers or researchers should always evaluate how the product is performed, especially the product work system. This evaluation stage can also be carried out to see the extent of the effectiveness of the learning media products developed by researchers by comparing the results of observations between the science process skills possessed by students before and after using learning media. The effectiveness of Google Sites learning media products with an inquiry learning orientation is seen based on data collected through visible or invisible observations of indicators of science process skills (Aditiyas & Kuswanto, 2023). Based on the results of observations before students used Google Sites learning media and afterward, it can be seen in **Figure 7** and **Figure 8** below:

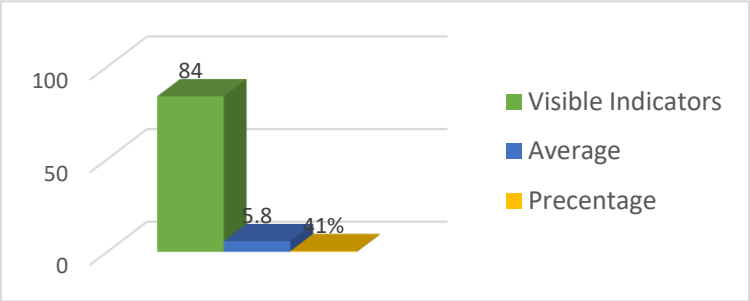

Figure 7. Observation results of science process skills before using Google Sites learning media.

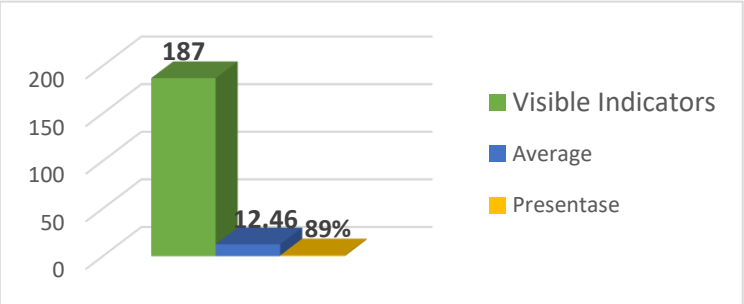

Figure 8. Observation results of science process skills after using Google Sites learning media.

The percentage of science process skills in students obtained from observations carried out after using Google Sites learning media shows a figure of 89%. Meanwhile, the percentage before students used Google Sites as learning media showed a figure of 41%.

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3.6. Validity of Inquiry Learning-Oriented Google Sites Learning Media to Improve Students' Science Process Skills.

The assessment carried out by media experts and Google Sites product material experts obtained feasible or valid results, in accordance with research conducted by Sevtia et al., (2022) that Google Sites learning media is valid or suitable for use as learning media. The data obtained shows that in terms of media, according to the assessment carried out by media expert validators, it is 97.5%, or falls into the very valid category. Google Sites learning media products are valid or suitable for use because the presentation and appearance aspects are appropriate to the material, easy and safe to operate, simple and easy to carry anywhere from a technological perspective, and able to develop students' cognitive knowledge to make learning more effective. This is in line with research conducted by Wahyudi et al., (2023) which states that Google Sites can be used to develop students' abilities and help make the learning process more effective.

3.7. Practicality of Inquiry Learning-Oriented Google Sites Learning Media to Improve Students' Science Process Skills.

This Google Sites learning media was tested on students in the 4th semester of Primary School Teacher Education, FKIP, Sriwijaya University who took part in the elementary science learning course, which was carried out during the even semester of 2024 for 40 students. The product testing process was carried out over 14 meetings with a meeting frequency of once a week, followed by collecting response questionnaires from students after using Google Sites learning media for one semester. At this stage of measuring practicality, the researcher went through 2 stages, namely a one-to-one trial involving 1 student, then continued with a small group trial of 14 students. Student responses were collected through a questionnaire containing 15 statements with three indicators. Based on the questionnaire that was filled out by the students, the researchers obtained a percentage of the scores that were processed to determine the practicality of the Google Sites learning media developed by the researchers.

The results of the data obtained from the student response questionnaire given show that of the 3 indicators measured by Google Sites learning media, it is at 89%, which means that the product used is very practical. Based on this, it can be interpreted that the learning media used is easy to understand, easy to use, can help the learning process, is in accordance with the desired learning activities, and motivates students to be enthusiastic about participating in learning activities.

Students who use learning media feel helped because the learning media developed by researchers can be integrated with many tools that can increase the variety of activities in learning. This is in line with research (Maharani et al., 2024), which states that learning activities using Google Sites can make it easier for students to deepen the material being studied. Next, the opinion expressed by Efendi and Insani (2024) is that learning facilitated by Google Sites will increase children's interest in learning activities.

3.8. Effectiveness of Inquiry Learning-Oriented Google Sites Learning Media to Improve Students' Science Process Skills.

The percentage of students' science process skills obtained from observations made by researchers using Google Sites learning media can be seen in Figure 2, namely 89%. Meanwhile, the percentage before students used Google's Sites learning media showed a figure of 41%. Previously, students' abilities had not been demonstrated in inferring, predicting, formulating hypotheses, naming and controlling variables, making operational

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definitions, conducting experiments, planning investigations, and applying concepts. Meanwhile, after using learning media, students began to come up with activities that reflected the expected indicators of science process skills in elementary science learning courses carried out at each meeting. A study conducted by Fitri et al., (2024) also states that Google Sites used in science learning are very effective in encouraging students' abilities to deepen the scientific process. Research conducted by Aisah and Agustini (2024) emphasizes that science process skills can be improved through learning activities involving website learning media such as Google Sites. Based on this, it can be seen that not only cognitive abilities are developed in students but also have an impact on improving students' science process skills. A literature study revealed by Stevani et al., (2024) states that scientific process skills are important for training in understanding, controlling, and applying these skills in life, which are always related to the scientific process.

4. CONCLUSION

The results of research on the development of inquiry-oriented Google Sites learning media to improve students' science process skills have concluded that it is very valid or very feasible if used to help the learning process, as evidenced by the validation score given by the validator of 97.5% for the assessment in terms of media, 97.5% for the assessment in terms of material, and 100% for the assessment in terms of language, which means that the media, materials, and language in the learning media used are very interesting, suit needs, and can be used as an alternative means of science learning activities in class.

The Google Sites learning media oriented towards inquiry learning to improve students' science process skills is also included in the very practical category, which is indicated by a percentage of 89%, so it can be interpreted that the students' needs in learning activities and variations are met by creating a website learning media that is oriented towards the inquiry model. Learning can be fulfilled very well so that students can easily explore the material directly in an active, fun, and high-interest learning activity.

The use of inquiry-oriented Google Sites learning media is also effective in learning activities, as evidenced by the increase in percentage figures before and after using learning media. Before learning using Google Sites media, the percentage of skills observed was only 41% from 14 indicators; after being treated differently by using learning media in learning activities, the percentage increased to 89%. Previously, students' abilities to infer, predict, formulate hypotheses, name and control variables, create operational definitions, conduct experiments, plan investigations, and apply concepts had not been seen. However, after using learning media, students began to show activities that reflected the expected indicators of science process skills in Natural Sciences (IPA) subjects at the primary school level at each meeting. Based on the facts obtained after the research, it was observed that students became more active in exploring the learning material individually and came up with activities that were in accordance with the expected indicators of science process skills.

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