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DEVELOPMENT OF INTERACTIVE LEARNING MEDIA BASED ON ARTICULATE STORYLINE FOR TEACHING MATHEMATICS ON PLANE SHAPES FOR GRADE IV AT SDN BARU 02 PAGI

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ABSTRACT

This study aims to develop interactive learning media based on Articulate Storyline as a medium for learning mathematics flat building material, and to determine the quality of products that have been made so that they are feasible and interesting to use in learning activities with the Research and Development (R & D) research and development method which refers to the ADDIE model or 5 stages in the form of analysis, design, development, implementation and evaluation. The subjects of this study were 25 fourth grade students. The data collection techniques used were observation and questionnaire. Data collection instruments with media validation sheets, material validation sheets, language validation sheets, teacher validation sheets, student response questionnaires. The results of the assessment from the experts are among others: the percentage of media experts 86% shows the criteria "very feasible", material experts 95% shows the criteria "very feasible", language experts 89% shows the criteria "very feasible", the results obtained by the teacher 92% shows the criteria "very feasible". The results of the small group trial get a percentage of 92% and the large group trial describes a percentage of 91% and describes the criteria "very feasible". Based on the results of the research data, it shows that Articulate Storyline Media becomes a media for learning mathematics theory of flat buildings that is very feasible and interesting to use.

KEYWORDS *Articulate Storyline Media, Math, Flat Buildings.*

INTRODUCTION

In today's advanced age, technology and science are developing more and more rapidly. These advances encourage people to develop and improve their skills and abilities to adapt to modern times. (Mulyani and Haliza, 2021). This change has an impact on various aspects, one of which is education. Through the impact of technology on education, learning patterns have also changed, which were

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originally teacher-oriented, but now are more student-oriented (Ulfa and Sari, 2021).

Technology-based media is an opportunity that can be integrated into the learning process. (Vawanda and Zainil, 2023). Learning media has now developed from audio, visual, and audio-visual to increasingly sophisticated multimedia. (Eriyanti et al., 2021). Learning media is crucial in its influence and can help students understand the material (Mulyawati & Kowiyah, 2018). Learning science through sight and hearing will be more enjoyable, less tiring, and intuitive. (Dirgantara et al., 2023).. Intuitive interactive media can also provide a tremendous open door for learners to conduct exploratory exams rather than just paying attention to the instructor (Vawanda & Zainil, 2023). Interactive learning media transforms learning into more interesting and enhances student engagement. In addition, it helps students develop technical skills that they will need in the future.

In learning mathematics, especially for elementary schools, it aims to make students tend to be confident in their abilities when facing a problem. (Adawiyah & Kowiyah, 2021). The importance of using media in learning in learning mathematics is that it allows teachers to explain the material being discussed in a way that is easy for students to understand. Technology-based learning media can also make learning math easy and fun, increase time and efficiency, because it does not require a lot of preparation in its operation so as to increase understanding of mathematical concepts. (Khairunnisa & Ilmi, 2020).

Based on the results of observations by researchers during PLP 2 and interviews conducted by researchers with Mrs. Dwi Suherlina, S.Pd. SD as a representative of class IV SDN Baru 02 Pagi, shows data that teachers are still unable to utilize participatory learning media in the learning stage. In this activity the teacher only explains the material and students listen. In addition, based on interview data with students, they experience difficulties when understanding the content of math subjects, because math involves numbers, they find it difficult, confusing, boring, and consider it to be difficult to understand.

From the results above, students do not fully understand the theory of mathematics subjects in grade 4, especially in mathematics learning. Seeing the reality above, the learning process at school is not in accordance with the expectations of teachers, students, and schools. This is due to the fact that teachers are still limited to conventional teaching methods when teaching material, therefore students understand and are less interested.

Therefore, these teaching and learning activities have many shortcomings. As explained above, the use of irregular methods, inappropriate learning media, and the provision of material that does not arouse student interest. so it is necessary to use IT-based learning media that is encouraging, motivating, and participatory and relevant to current progress. This allows students to actively participate during teaching and learning activities. The use of participatory learning media such as Articulate Storyline published on the web is a good solution because it does not require large storage space.

Articulate Storyline media has been developed by several experts (Febrian & Zainil, 2023; Husain & Ibrahim, 2021; Safira et al., 2021).. The difference in

previous research is that no one has produced a product using flat building material and the use of quizzes on the media.

This research develops participatory learning media through Articulate Storyline. Articulate Storyline is an application designed to support the teaching and learning process by presenting educational theory in a participatory and motivating way. (Alperi & Handayani, 2022).. Articulate Storyline allows students to contribute directly to the information delivery stage of teaching and learning and can be used to organize tests and quizzes. Therefore, the use of participatory learning media based on IT is so appropriate in the process of learning mathematics, especially grounding theory.

RESEARCH METHOD

This research uses the Research and Development (R&D) method, with the method of improving a new product or adding a previous product. This research also uses the ADDIE development model in the form of five processes, including analysis, design, development, implementation, and evaluation. The subjects in this study were fourth grade students of SDN Baru 02 Pagi as many as 25 students.

Researchers conducted instrument testing with expert validation, teachers, and student questionnaires in calculating variables. The level of feasibility and attractiveness of the product was measured using a percentage formula:

$$P = \frac{Skor\ yang\ diperoleh}{skor\ maksimal} \text{ x } 100\%$$

After getting the data results with the formula above, it is interpreted in the table below: (Ulya & Rofian, 2019)

Table 1. Criteria for Validity Results

Percentage	Category
81% - 100%	Very Feasible
61% - 80%	Worth
41% - 60%	Less Feasible
21% - 40%	Not Feasible

RESULT AND DISCUSSION

This research uses a form of research and development with products that are made to increase the Articulate Storyline in the theory of flat buildings for class IV. This research uses the ADDIE development model, in the form of Analysis, Design, Development, Implementation, and Evaluation.

Analysis Stage

This research was conducted in class IV SDN Baru 02 Pagi East Jakarta, previously the researchers conducted observations at the school and found that the teaching and learning stage tends to use lecture techniques and students have not

fully used the media when the teaching and learning stage is running only using the blackboard as a means of conveying material. This has an impact on students who look bored and less focused when listening to the material presented.

Based on this problem, participatory learning media using articulate storyline in flat building theory will be developed to be one of the many media for students to learn at school and learn wherever they are.

Design

The design stage is a continuation of the analysis process. In the process of designing learning media, design sketches are needed in order to facilitate the production of learning media. The sketch is in the form of a flowchart.

Flowchart Creation

The flowchart design used to explain the media that has been developed is presented in Figure.

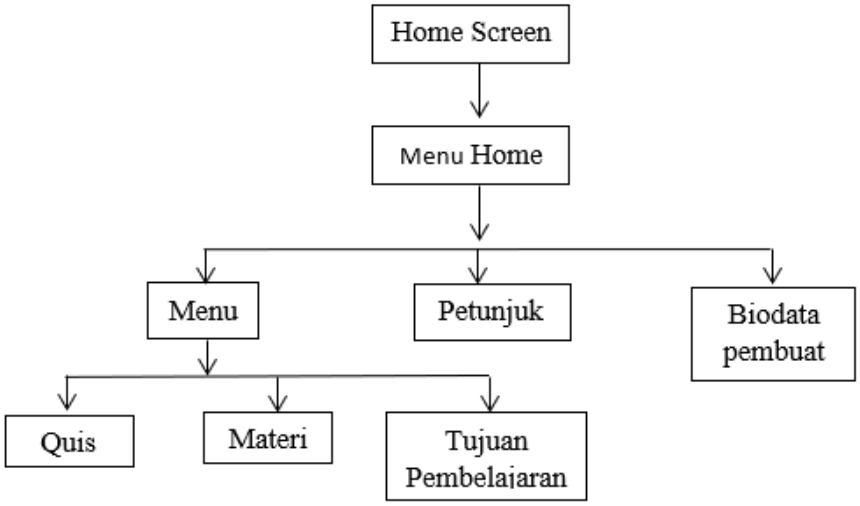


Figure 1. Flowchart of Articulate Storyline Media

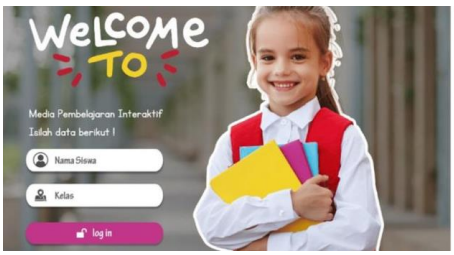
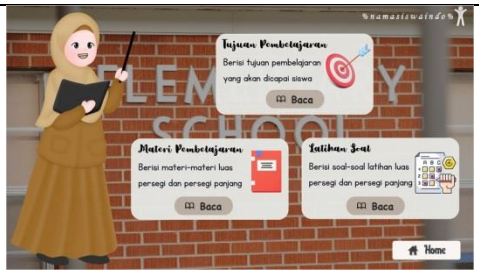
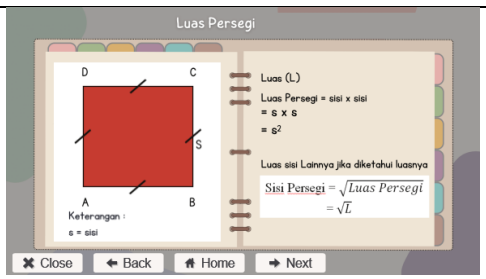
Figure 1 describes the program flow of the *Articulate Storyline* learning media created starting from the initial *loading screen* and login button. On the login page there is a column to fill in the name and class. Then the material title and instructions for using the media appear. After that, it enters the main menu which contains navigation buttons that appear to the selected menus, namely the author's biodata menu, learning objectives, materials, and quizzes.

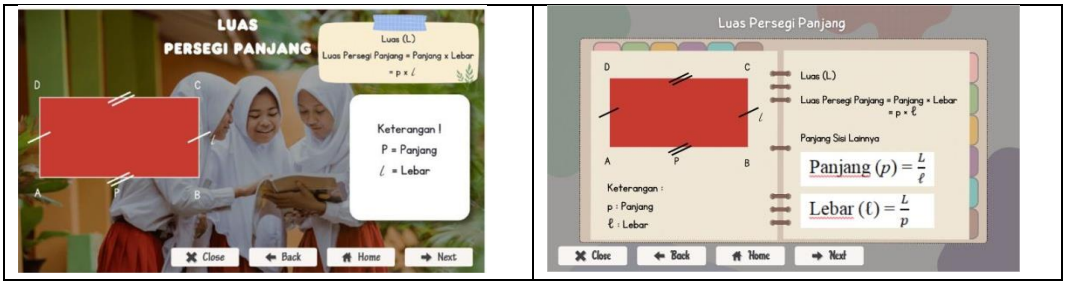
In the author's bio section there is a profile of the media maker. The learning outcomes section contains the learning outcomes that will be achieved. In the theory section contains an explanation of the area of rectangles and squares. In the quiz section displays 5 questions about the theory of rectangles and squares that have been explained in the material menu section.

Development

In this stage the learning media that has been made using *articulate storyline* will be shown to the supervisor, to assess its quality so that it can be immediately validated by the expert, after the supervisor approves, a validity test is carried out, namely, validation from a person who masters the theory, masters the media, and masters the language. After the expert trial is carried out, an assessment of the media is obtained, whether or not it is suitable for use in the field. At this stage there is a product revision process. Here are the results before and after product revision:

Table 2. Articulate Storyine Before and After Design

Display Before Revision	Display After Revision
	
	
	
	



Implementation

The implementation stage is the stage where experiments are carried out in the field. After the media is validated by experts who master media, material, language, and teachers. The media was tested on small and large groups. For small group tests with 5 students and large group tests with 25 students.

Evaluation

At the implementation stage, the results of the media evaluation were obtained, the product was declared suitable for use. After passing the evaluation from experts who master the material, media, language and teachers, as well as being tested for students.

Model Feasibility

Validation Result

The next stage after the product has been developed is to carry out the media validation stage for validators, namely experts in media, material, language, and teachers. This stage consists of testing and validating through experts. This has the intention of understanding whether the product development design is feasible or not before it is tested on students. From the results of the validator's assessment, it is used as a reference for improving the improved media so that it is maximized. The validari results from the validators are as follows:

Media Expert Validation

Media validation aims to obtain the results of the feasibility of learning media that has been developed. In this stage, the validation test was carried out with 3 media experts. Then, the validation results from the validators include:

Table 3. Media Expert Validation Test Results

Aspect Name	Score obtained	Maximum score	Average percentage	Category
Content aspect	27	30	90.00 %	Very Feasible
Usability aspect	50	60	83.00 %	Very Feasible
Display aspect	27	30	90.00 %	Very Feasible
Programming aspects	26	30	86.00 %	Very Feasible
Grand Total Percentage	130	150	86.00 %	Very Feasible

From the results of the validation test obtained from the 3 media experts above, the quality and feasibility of the media assessed in terms of content, usability, visual aspects, and program aspects get an average percentage of 86.00% at a very feasible value.

Material Expert Validation

Material validation has the intention of estimating how feasible and appropriate the material compiled on the learning media is. In this stage, the validation test was carried out with three material experts. The validation results from the validators include:

Table 4. Material Expert Validation Test Results

Aspect Name	Score obtained	Maximum score	Average Percentage	Category
Content aspect	45	45	100.00 %	Very Feasible
Usability aspect	54	60	89.00 %	Very Feasible
Display aspect	44	45	97.00 %	Very Feasible
Grand Total Percentage	143	150	95.00 %	Very Feasible

From the results of the validation test obtained from the three material experts above, the quality and feasibility of the material in terms of content, usability, and appearance aspects obtained an average percentage of 95.00% with a very decent score.

Linguist Validation

Language validation has a purpose in calculating how feasible and appropriate the language compiled in the learning media is. In this stage, the validation test was carried out for two people who mastered the language. From the validation results of the validators, among others

Table 5. Results of the Language Expert Validation Test

Aspect Name	Score obtained	Maximum score	Average Percentage	Category
Content aspect	18	20	90.00 %	Very good
Material presentation aspect	18	20	90.00 %	Very good
Learning aspects	17	20	85.00 %	Very good
Linguistic aspects	36	40	90.00 %	Very good
Grand Total Percentage	89	100	89.00 %	Very good

From the results of the validation test obtained from 2 people who master the language above, the quality and feasibility of language assessed from the fields of material content, material presentation, learning, language obtained an average percentage of 89.00% in the very feasible category.

Teacher Validation

Teacher validation aims to assess what is compiled in the learning media. From the validation results from the validators, among others:

Table 6: Teacher Validation Test Results

Aspect Name	Score obtained	Maximum score	Average Percentage	Category
Content aspect	14	15	93.00 %	Very good
Learning aspects	24	25	96.00 %	Very good
Aspects of media use	23	25	92.00 %	Very good
Language Aspect	8	10	80.00 %	Good
Grand Total Percentage	69	75	92.00 %	Very good

Based on the results of the validation test obtained from the teacher above, the quality and feasibility of learning media assessed from the fields of material content, learning, media use, language get an average percentage worth 92.00% with a very feasible value.

Media Revision

From the validation carried out by the validator, it did not escape the suggestions and criticisms that came from the experts. There are revisions that are carried out for learning media that have been improved so that they become even better and more attractive. But the product made is suitable for the next stage. Below are various criticisms and suggestions submitted by validators:

Table 7. Revisions from Validators

No.	Validator	Feedback and suggestions	Description
1.	Media expert	Background on the media is adjusted to the theme The time stamp on the quiz is enlarged Create a clearer flow in the menu section Animation changed to general model Title enlarged Biodata is not entered into the menu	Revised
2.	Material expert	Learning objectives of one KKO Explanation of the material is more expanded Fixed questions from C1-C6 It is better if the example question is given a number Example questions and quiz discussion must be the same	Revised
3.	Linguist	More attention should be paid to the use of capital letters The use of font color in the instructions for use is equalized Material writing is not abbreviated Writing units of length more attention	Revised

No.	Validator	Feedback and suggestions	Description
4.	Teacher	More discussion of material and example questions according to the level of analysis and evaluation.	Revised

Based on table 7, the suggestions and input submitted by the validators have been revised to the *articulate storyline* learning media, making the media better and suitable for testing.

Model Effectiveness

Small Group Trial

In this stage, the articulate storyline learning media is tested on small group trials. The purpose of this stage, namely in understanding the effectiveness and how feasible the media run in order to produce suggestions and further revisions. This small group test was conducted in a home environment with the approval of the supervisor, with a total of 5 students involved. Students are asked to assess the media that has been developed through the respondent questionnaire stage that has been given. Based on the results of the respondent's questionnaire, the percentage results were obtained.

Table 8. Small group test assessment results table

Aspect Name	Score obtained	Maximum score	Average Percentage	Category
Learning aspects	91	100	91.00 %	Very good
Media aspects	71	75	94.00 %	Very good
Display and Language aspects	69	75	92.00 %	Very good
Grand Total Percentage	231	250	92.00 %	Very good

Based on the results obtained from the small group trial, the overall average percentage was 92.00% with a very decent score.

Large Group Trial

The large group trial is the final process of the experiment. The large group trial was carried out at SDN Baru 02 Pagi East Jakarta with a total of 25 respondents in class IV. Students are asked to assess the media that has been developed through the fulfillment stage of the respondent questionnaire that has been provided. The results of the large group trial conducted are reviewed in the table, among others:

Table 9: Student Trial Assessment Results Grade IV at SDN Baru 02 Pagi

Aspect Name	Score obtained	Maximum score	Average Percentage	Category
Learning aspects	446	500	89.00 %	Very good
Media aspects	352	375	93.00 %	Very good
Display and Language aspects	348	375	92.00 %	Very good
Grand Total Percentage	1.146	1.250	91.00 %	Very good

Based on the results obtained from the large group trial, the average percentage obtained was 91.00% in the very feasible category. So, it can be concluded that *articulate storyline* learning media is feasible to use and successfully developed into a mathematics learning media in the theory of flat buildings in grade IV elementary school students after the last trial process, namely the large group trial.

Discussion of Research Results

The results of this study are interactive learning media from articulate storyline in flat building theory through the use of the ADDIE development model which has been assessed by validators, teachers, and students. The ADDIE development model was chosen because according to the opinion of Suci Lestari & Sujana (2021) the ADDIE development model is made in detail and systematically which makes it possible to solve a problem when learning is related to learning resources and can be equalized to the needs and personalities of students.

The ADDIE development model has 5 processes including analysis (Analysis), planning (Design), development (Development), implementation (Implementation) and evaluation (Evaluation). In the analysis process (Analysis), it carries out a needs analysis, material analysis, and media making analysis so that the use of articulate storyline media can be developed and the learning process takes place well. Furthermore, the design stage (Design) researchers made a flowchart as a reference in compiling articulate storyline media.

Then enter the development stage (Development) where the articulate storyline media is made as attractive as possible by using animated images and various colors. The media that has been developed is then validated for people who master the media, material, language and teachers. Validators provide value by filling out a questionnaire and submitting suggestions and criticisms for articulate storyline media products. Validation was carried out by eight experts, namely three media experts, three material experts, and two language experts as well as validation by teachers. Media experts get an average percentage of 86.00% at a very good value. Material experts get an average percentage of 95.00% at a very good value. Language experts get an average percentage of 89.00% at a very good value. Teachers get an average percentage worth 92.00% at a very good value. After the media is validated, then make improvements based on criticism and suggestions submitted by the validator.

In the implementation process (implementation) is run through 2 different groups, namely running small group trials and large group trials. In knowing to enter the attractiveness and feasibility of articulate storyline media through the process of distributing response questionnaires for students. After students fulfill the response questionnaire, the results of the articulate storyline media percentage

are obtained with a small group trial percentage of 90.00%, while the large group trial is 91.00%. From the above assessment results, it can be concluded that the articulate storyline media product is very feasible and can be used.

The last stage carried out is an evaluation (Evaluation) of articulate storyline learning media based on suggestions obtained during the implementation stage, namely in the form of answers from students. From the table of the results of the fourth grade students' answers to the articulate storyline media obtained an average response of 91.00% with a very good category so that there were no significant changes to the improved articulate storyline media.

Participatory learning media with articulate storyline is very feasible to use and interesting for learning purposes in flat building theory because it is interesting, interactive and contains quite complete material. Articulate storyline learning media has advantages such as, it can be in the form of animated images, is interactive so that it can involve students, can be accessed anytime and anywhere via the internet through the use of smartphones, laptops or computers. However, this articulate storyline media has disadvantages, namely, articulate storyline media must be used using the internet, the teacher is not able to see who is using it and the creator is not able to understand the results of the scores obtained by students, therefore the media developed using Articulate Storyline is not suitable when used for learning evaluation. (Mufidah and Khori, 2021).

CONCLUSION

Based on the results of the research and discussion that has been explained, the things that are concluded include: 1) Improvement of participatory learning media with articulate storyline on flat building material using the ADDIE model which was tested at SDN Baru 02 morning on grade IV students. 2) The feasibility of articulate storyline learning media based on the assessment results obtained through the results of the validation test by media experts illustrates that interactive learning media based on articulate storyline obtained a score worth 86.00% in the form of a very feasible value, the results obtained by material experts obtained a score worth 95.00% with a very feasible value, the results obtained by linguists obtained a score worth 89.00% with a very feasible value, the results obtained by the teacher obtained a score worth 92.00% with a very feasible value. 3) Implementation on students in class IV conducted by 25 students obtained the results of the feasibility and attractiveness of learning media amounting to 91.00% with a very decent value, so the articulate storyline media is feasible and interesting to use when helping students learn on flat building material.

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