DEVELOPMENT OF WEBSITE-BASED INTERACTIVE LEARNING MEDIA USING GOOGLE SITES ON SOUND WAVE MATERIAL

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Abstract: One of the difficulties students have in learning physics is due to external problems from teachers who do not utilize learning media. This research aims to develop website-based interactive learning media using Google Sites for sound wave material. This research method is research and development (R&D) with a 4D development design, which consists of 4 stages: define, design, develop, and disseminate. The instrument used in this research was an expert validation sheet. The learning media created is created and then validated by 3 media experts and 3 material experts. This is to obtain media eligibility criteria, thereby allowing for necessary assessments and revisions. From the assessment results from media expert validators, a score of 89.63% was obtained with very valid criteria, while from material expert validators, a score of 83% was obtained with very valid criteria. Website-based interactive learning media using Google Sites on sound wave material has been created and tested with media expert validators and also material experts. From these results, it can be concluded that this learning medium is suitable for use as an interactive learning medium in class XI sound wave material.

Keywords: Development, learning media, websites, google sites, sound waves

INTRODUCTION

Education is a system in which there are several components that are closely related. There are many problems and difficulties in the field of education, such as obstacles that must be overcome by educational institutions to produce quality human resources and ensure students understand subjects that are considered challenging (Hariyanto, 2007).

Physics is a subject that is considered challenging and, at the same time, a subject that is feared by students. In a study, it was explained that as many as 54.11% of students' difficulties in learning physics were due to external factors from teachers who did not maximize learning media. (Fitra Suci Arista et al., 2013).

Thus, great emphasis is placed on physics teachers to create practical, creative, and innovative learning media so that students are more interested in physics subjects (Muhammad, 2020). One of the practicalities of learning media is that students can complete their learning without always having to meet directly with the teacher, and it can be accessed anytime, anywhere, and under any circumstances (Ma'ruf et al., 2017).

Rapid technological developments have a significant impact on the development of the education sector (Kalolo, 2019). Teachers can use the internet as a learning resource and optimize it in developing teaching materials (Alenezi, 2020). Modifications and development of internet media are carried out with the aim of increasing students' interest and interest in learning (Cheva et al., 2019).

Current technological developments have developed very rapidly. Teachers must be able to take advantage of developments in digital technology (Ng, 2015). Currently, there are many learning media that utilize technological developments, one of which is learning to utilize the internet network (Rosen & Jaruszewicz, 2009). One type of learning that utilizes internet networks is website-based learning.

One platform that makes it easy to create a website to create effective and interesting learning media is Google Sites. Google Sites is one of Google's website platforms, which is quite well known, easy to use, and can be accessed anywhere (Nasution & Harahap, 2022).

Apart from being able to display material, writing and images, Google Sites can add simulations where these simulations can increase students' understanding of the material being discussed. Apart from that, using Google Sites is also easy to add learning videos and evaluations which can be integrated with Quizizz, Wordwool, and Google From.

Research results (Mukti et al., 2020) claim that the reason Google Sites is used to create learning media is because Google Sites allows teachers to share content based on their needs

and collect various information on one platform, including text, videos, presentations, attachments, and much more.

Previously, there had been research on developing learning media using the Google site on waves and sound material (Akuba et al., 2023; Ismawati et al., 2021; Ramadanti et al., 2023). However, the media provided still needs to be improved a lot, such as by not providing interactive simulations and evaluation questions (Pellas et al., 2019). Apart from that, other studies also did not use the same research design as 4D (Maryani et al., 2022). However, it uses an MDLC research design. Apart from that, there is also other research, namely developing teaching materials on magnetic electricity (Yusuf et al., 2023).

From the analysis of previous research studies, there has been no research on the development of website-based interactive learning media using Google Sites for sound wave material for class XI. The aim of this research is to develop website-based interactive media using Google Sites on sound wave material for class XI.

METHOD

This research is development research, or R&D (research and development), which is used to create a particular product and evaluate its effectiveness (Sugiyono, 2011). The development method in this research follows the 4D (four-D) research and development design. This design is structured in four main stages: define, design, develop, and disseminate (Thiagarajan et al., 1974). 4D development stages, as shown in **Figure 1**.
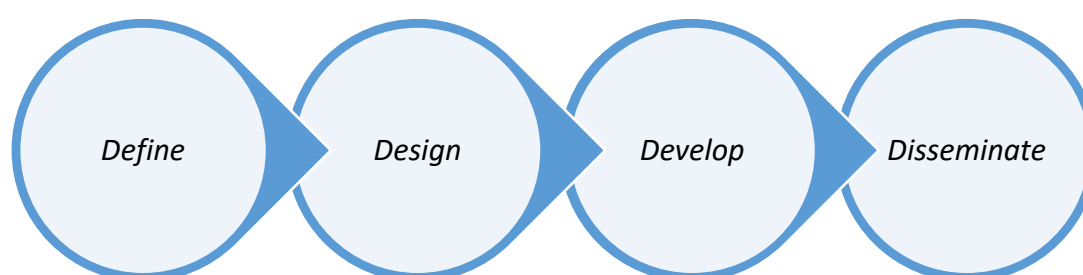

Figure 1. Stages of 4D development

The first stage is definition, where researchers carry out curriculum analysis, student needs analysis, and material analysis. The second stage is design, where in the design process, the initial step is to create an initial concept and initial design for the learning media that will be created. The next step is the development stage, where the learning media created is

created and then validated by 3 media experts and 3 material experts. This is to obtain media eligibility criteria, thereby allowing for necessary assessments and revisions. The final stage is distribution, where this learning medium will be distributed to students and can be accessed publicly.

The data collection instrument in this research was a validation test by media experts and material experts. The validation sheet is used to assess Google Sites-based learning media, consisting of media experts with 3 assessment aspects and material experts with 5 assessment aspects. The assessment consists of 5 categories, namely very good (5), good (4), quite good (3), not good (2), and not good (1). The data analysis technique for feasibility testing uses the following **Equation 1**.

$$\overline{X} = \frac{\sum x}{N} \qquad (1)$$

Information:

$\overline{X}$: Average rater scores

$\sum x$: The total score of the assessors

N: Number of appraisers

After getting the average score, you can then find the percentage value using **Equation 2**.

$$\text{average results} = \frac{average\ score}{total\ score} \times 100 \qquad (2)$$

The assessment criteria can be known by looking at the ideal assessment range, as shown in **Table 1** (Afriani & Fitria, 2021).

Table 1. Score percentage interval criteria

Score Percentage Interval	Criteria
81%≤ X ≤100%	Very Valid
61%≤ X ≤80%	Valid
41%≤ X ≤60%	Enough
≤40%	Invalid

FINDING AND DISCUSSION

Learning Media Results

This research produces a website-based interactive learning media product using Google Sites on wave and sound material for class XI, which can be accessed via the website https://sites.google.com/view/gelombang-bunyi-kelas11.
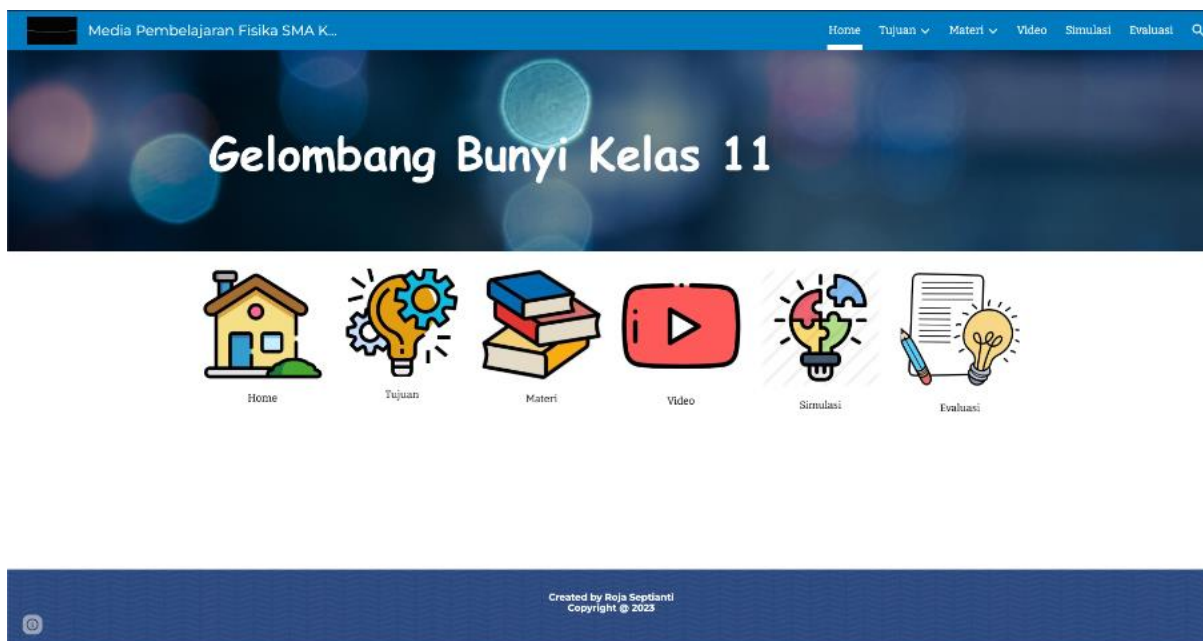
Figure 2. Home Display

Figure 2 is the main Home display which displays objective menu information, materials, videos, simulations and evaluations. This information is to make it easier for students to access each page they need. There is also a menu in the header to make it easier for students to access each content more quickly.
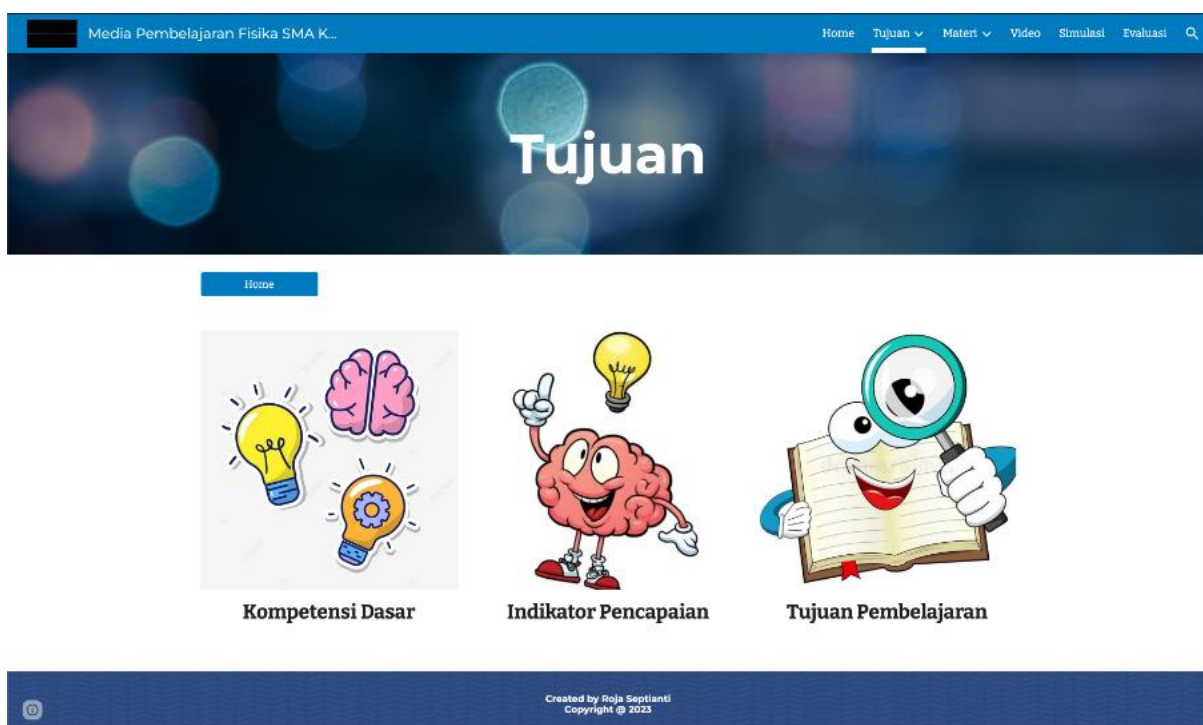

Figure 3. Destination Display

Next, display the contents of the objectives menu as shown in Figure 3. In the objectives, there is a submenu of basic competencies, achievement indicators, and learning objectives. The material menu display is as shown in **Figure 4**.

Figure 4. Material Menu Display
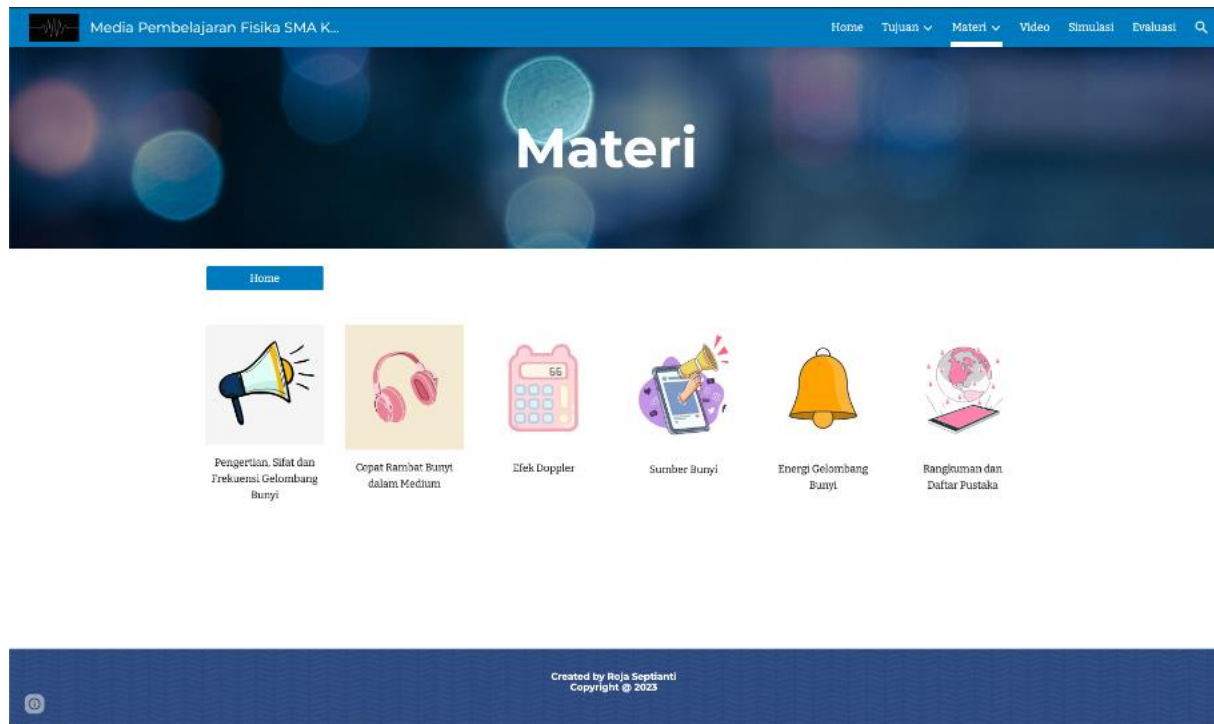
In the material menu display there are sub-materials that will be discussed, namely, definition, properties, frequency of sound waves, speed of sound propagation in a medium, doppler effect, sound sources, wave energy, summary and bibliography. The material is made as interesting as possible and each sub-topic is made into a separate page to make it easier for students to learn each stage.

Figure 5. Display on The Video

Figure 5 is a display on the video page that contains two videos that can increase students' understanding of sound wave material. Furthermore, what is no less important and interesting is the simulation display, as shown in Figure 6. Students can carry out interactive simulations independently or with teacher guidance.
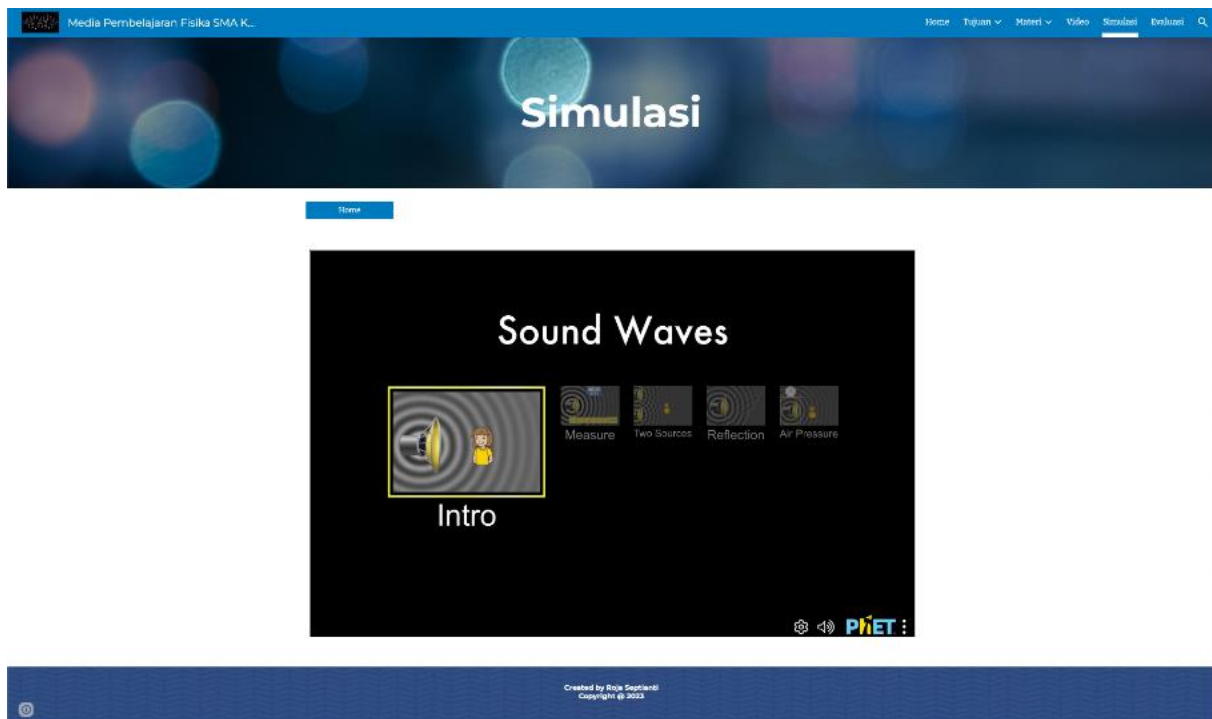

Figure 6. Simulation Display

Then the last one is the evaluation menu as in **Figure 7**, where students work on evaluation questions about the material that has been discussed or studied.
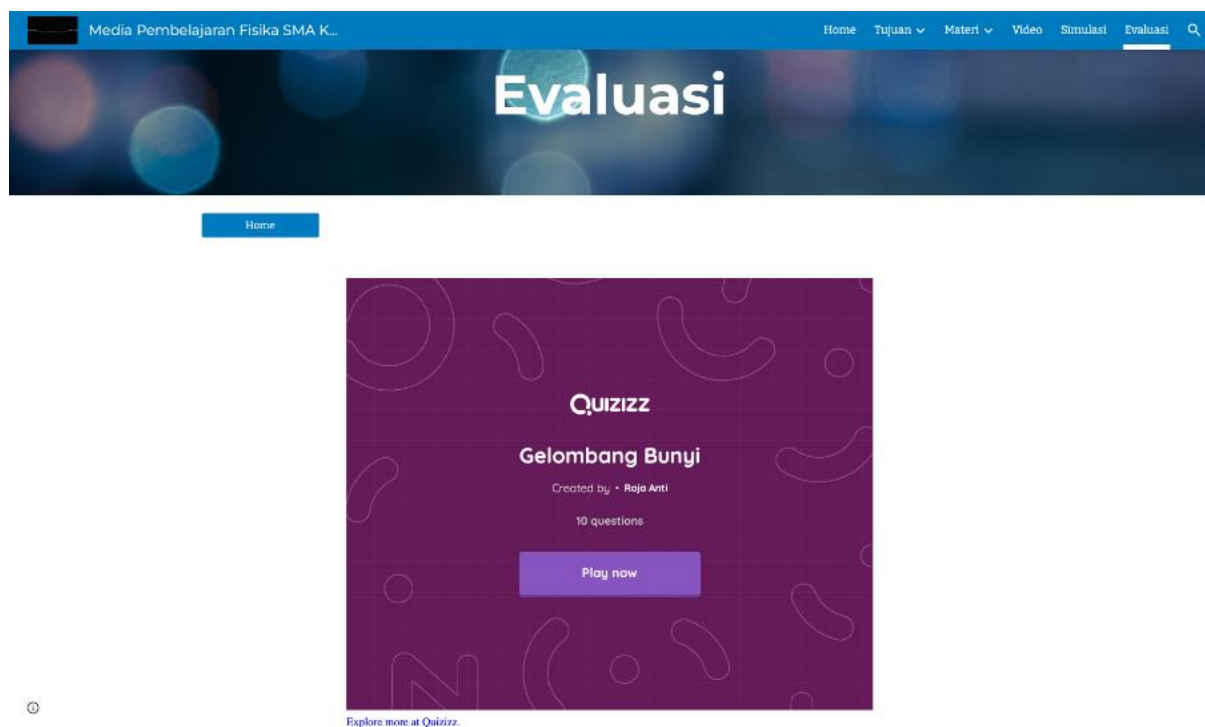

Figure 7. Evaluation Display

Learning Media Validation Results

Product validation was carried out by 3 media experts and 3 material experts. The media expert validation sheet consists of 10 questions which are divided into three aspects of assessment indicators, namely illustration, quality and appearance, and attractiveness. Data from media validation results are as in **Table 2.**

Table 2. Media Validation Results Data

Indicator	Average Score	Percentage (%)
Illustration	4,50	90,00
Quality and Appearance	4,94	98,89
Attractiveness	4,00	80,00
Average	**4,48**	**89,63**

The results of the media expert validator's suggestions which have been revised include adding instructions for media use. From the media expert validation results above, an average percentage of 89.63% was obtained, so it can be concluded that website-based interactive learning media using Google Sites on sound wave material falls within the very valid criteria according to media experts as referenced in **Table 1** (Afriani & Fitria, 2021).

These results cannot be separated from the quality of interactive learning media that is attractive to students. In it, there are illustrations that invite students to be interactive in learning, for example, interactive simulations of sound waves, learning videos, and an interesting evaluation. Apart from that, the attractive display quality makes students feel inspired to learn; therefore, the quality and display indicators are rated at the highest percentage by validators, namely 89.63%.

Next, the material expert validation sheet consists of 43 questions consisting of five aspects of assessment indicators, namely: appropriateness of content, appropriateness of presentation, appropriateness of language, evaluation, and realistic. The data from the material validation results is as in **Table 3**.

Table 3. Data from Material Validation Results

Indicator	Average Score	Percentage (%)
Eligibility of content	4,18	83,59
Feasibility of presentation	4,17	83,33
Language eligibility	4,07	81,33
Evaluation	4,33	86,67
Realistic	4,24	84,76
Average	**4,20**	**83,94**

The result of the revised material expert validator's suggestions is that the material presented is appropriate to the current situation. From the results of the material expert validation above, an average percentage value of 83.94% was obtained, so it can be concluded that website-based interactive learning media using Google Sites on sound wave material for class XI falls into very valid criteria according to material experts as referenced in Table 1 (Afriani & Fitria, 2021).

According to media experts, the very valid criteria results are inseparable from the fairly comprehensive content information in the learning media that has been created. There are 6 sub-materials provided in the learning media so that the material information conveyed is very complete. In addition, the accuracy of the content presentation is in accordance with student competency standards. The evaluation questions that have been provided are presented in the form of an embed from Quizizz which is interesting to work on so that it gets the highest percentage of 86.67%.

CONCLUSION

Website-based interactive learning media using Google Sites on sound wave material has been created and tested with media expert validators and also material experts. From the results of media expert validators, a percentage of 89.63% was obtained, while material experts obtained a percentage of 83.94%. From the results above, it can be concluded that website-based interactive learning media using Google Sites on sound wave material has proven to be suitable as a learning media.

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