

DEVELOPMENT OF WEE GEMAS LEARNING MEDIA BASED ON STUDENT LEARNING STYLES FOR PHYSICS SUBJECTS

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Abstract

Wee Gemas (Golden Generation Educational Website) is a learning media in the form of web-based teaching materials that are integrated with student learning styles. This study aims to determine the effectiveness of Wee Gemas in learning physics in high school. It is expected to be able to support student learning independently in understanding Physics learning can make students more independent in understanding Physics lessons. The method used is R&D development, which consists of several stages, namely potential and problems, information gathering, product design, design validation, design improvement, first product testing, product revision, and second product testing. The results of media validation on aspects of learning, material, and media each obtained a validity percentage of 97.27%; 87.5%; and 94.77%. In trials that were tested in small groups obtained very good results in their category. In the final pre-test and post-test involving 32 students of SMA Hangtuh Sidoarjo with an average N-gain score of 56.06% in the effective category.. It can conclude that Wee Gemas learning media is said to be feasible with the predicate very good and useful for use, especially during the Covid-19 pandemic where students must learn from home. Access to learning resources that are following student learning styles is very much needed by students when teachers are not fully able to explain the physics learning during online meetings with students.

Keywords: Students; Website; Learning style; Learning media.

Abstrak

Wee Gemas (Situs Edukasi Generasi Emas) merupakan media pembelajaran berupa bahan ajar berbasis web yang terintegrasi dengan gaya belajar siswa. Penelitian ini bertujuan untuk mengetahui keefektifan Wee Gemas dalam pembelajaran fisika di SMA. Diharapkan dapat mendukung pembelajaran siswa secara mandiri dalam memahami pembelajaran Fisika dapat menjadikan siswa lebih mandiri dalam memahami pelajaran Fisika. Metode yang digunakan adalah pengembangan R&D, yang terdiri dari beberapa tahapan yaitu potensi dan masalah, pengumpulan informasi, desain produk, validasi desain, perbaikan desain, pengujian produk pertama, revisi produk, dan pengujian produk kedua. Hasil validasi media pada aspek pembelajaran, materi, dan media masing-masing diperoleh persentase validitas sebesar 97,27%; 87,5%; dan 94,77%. Pada uji coba yang diujikan pada kelompok kecil diperoleh hasil yang sangat baik dalam kategorinya. Pada pre-test dan post-test akhir melibatkan 32 siswa SMA Hangtuh Sidoarjo dengan kategori cukup efektif. Dapat disimpulkan bahwa media pembelajaran Wee Gemas dikatakan layak dengan predikat sangat baik dan bermanfaat untuk digunakan terutama pada masa pandemi Covid-19 dimana siswa harus belajar dari rumah. Akses sumber belajar yang mengikuti gaya belajar siswa sangat dibutuhkan oleh siswa ketika guru tidak sepenuhnya mampu menjelaskan pembelajaran fisika pada saat pertemuan online dengan siswa.

Kata kunci: siswa; situs web; gaya belajar; media pembelajaran.

INTRODUCTION

Education is one of the main factors in creating a generation of people who have high insight and good character. One way to get an education is through school as a formal education pathway with a structured and academic learning process. Also, the subject matter developed must be compiled and implemented based on the characteristics of students. The improvement of the learning process is directed at improving the quality of learning and innovation in learning. Along with the improvement of the learning process, the role of the teacher is no longer just teaching in class but also required to know complete information about each student. (Budiningarti et al., 2015) This is of course to provide the best learning for students. One of the efforts that can be made to create the best learning for students is to use a variety of learning resources.

The existence of learning resources will facilitate the learning process in achieving learning objectives. Learning resources can be in the form of information presented in various types of media that can help students improve learning outcomes to be achieved. Teaching materials are part of the learning resources. Teaching materials play an important role in helping students achieve learning goals.

As explained by the Ministry of National Education (2008, p.2), teaching materials are an important part of the implementation of education in schools. Through teaching materials, the teacher will find it easier to carry out learning and students will be helped and easier in learning. Teaching materials developed with various variations will make learning activities more interesting (Atsani, 2020). Especially during the Covid 19 pandemic, to break the chain of spreading the virus and maintain the security and safety of students and educators. (Aji, 2020) With this appeal, the learning process was carried out from home by utilizing internet technology and media like using Zoom and Google meet which says it's easy (Eppy et al., 2020) but on the other hand, of course, you need additional media. So the teacher is also indirectly required to get out of their zone and make other learning innovations so that the impression of student learning is not monotonous in a class that only relies on powerpoint and lectures. (Karo et al., 2018) One way to produce attractive teaching materials is to apply web-based teaching materials. Web-based teaching materials are said to be attractive if students feel comfortable using web teaching materials in learning (Serevina et al., 2020). Besides being interesting, web teaching materials can make it easier for students to access various learning materials because they contain two or more content in the form of text, images, sound, animation, video, and others. (Prahani et al., 2020) Every student in learning has advantages and disadvantages in understanding the subject matter. Weaknesses that are accepted as they are will try to be analyzed and resolved while the strengths that are owned will be managed and developed in a better direction to obtain optimal results.

This research produces a product in the form of a web-based teaching material called Wee Gemas (Golden Generation Education Website). To know the feasibility and effectiveness of Wee Gemas (Golden Generation Education Website) on physics subjects in high school. Besides, this teaching material is also expected to make students more independent in understanding Physics lessons. Abstract concepts are often found in physics subjects, making it difficult for students to understand. Apart from various factors it is also possible to have misconceptions. The causes of experienced physical misconceptions by students can come from the initial concept or preconceptions before students follow lessons or due to thinking which is humanistic, namely behavior things that are understood such as behavior humans or living things. (Muhammad et al., 2017)

The ease of learning independently will certainly have a positive impact on students in developing their knowledge. Access to learning resources by student learning styles is of course very much needed by students when the teacher is not fully able to explain the material at school. (Yunitasari et al., 2020) The demands of the 2013 curriculum also require that students be active in looking for teaching resources or materials that have been provided, both printed and non-printed, which can be obtained from the internet. (Tafonao, 2018).

METHOD

This research was conducted by involving 32 respondents from 10th-grade high school students in the Mathematics and Natural Sciences Department at SMA Hangtuah Sidoarjo.

This research is a type of development research (Research and Development). Following what was stated by (Sugiyono, 2009), the R&D method is an analysis used to produce specific products and test its effectiveness. This study uses a development model, according to Sugiyono (2009). According to Sugiyono, the R&D development research steps consist of several stages: potentials and problems, information gathering, product design, design validation, design improvement, product design, design validation, design improvement, first product testing, product revision, and second product testing. As shown in Figure 1.

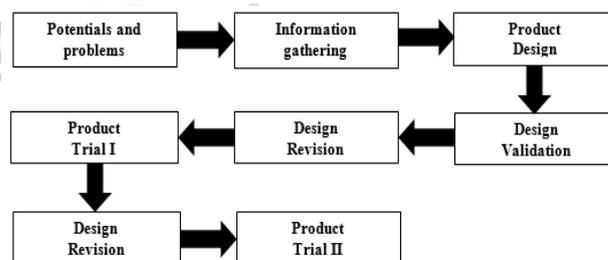


Figure 1. R&D research design that will be developed.

Potential and Problems. Potential is something that has added value if used optimally. The problem itself is a problem that must be solved, the existence of a problem can open up new potential. with the potential and problems can develop something new to meet the challenges of the times.

Information gathering. collect information as well as literature studies that are useful for designing products or solutions to solve a problem in accordance with existing potentials.

Product design. The product design is designed based on the newness of the product to be made. Product design usually in the form of pictures or charts.

Design validation is carried out for assessing a product design, related to the effectiveness of the new product work system. Product validation is carried out by experts or experienced experts.

Design revision. From the results of the validity that has been carried out, it will be found several weaknesses of the related product. Design revision aims to reduce or improve product weaknesses.

First product testing, from the product design that has been made, it will be tested first. In this study, the trial was conducted by 10 students who were randomly selected. Students who have tested the questionnaire to be filled in to find out the shortcomings of the product design.

Design revision. The test results in small groups consisting of 10 students randomly showed the performance of the product. If there is a shortage, it is necessary to do a second revision to produce an effective and feasible product.

Second product trial, based on the results of the tests carried out, if it is considered successful then the product can be applied in the learning process..

The types of data used in this research are qualitative and quantitative. Qualitative data were obtained from criticism and suggestions from the validators and trial correspondents. Quantitative data were obtained from data from the validation results of the validators and trial data in pre-test and post-test.

Wee Gemas (the Golden Generation Educational Website) being developed will be analyzed for its feasibility using validation analysis. This validation analysis will be carried out by an expert lecturer and two subject teachers to assess the feasibility of Wee Gemas. The rating scale uses the Likert rule as in

Table 1. Likert Scale Criteria

Assessment Indicators	Percentage
Poor	1
Very Poor	2
Good	3
Excellent	4

Furthermore, the percentage of the assessment obtained is calculated using the formula:

$$P = \frac{K}{n} \times 100\%$$

(Riduwan, 2012)

With:

P = percentage obtained

K = number of respondents' answers

n = the highest score in the questionnaire

From the results of the calculations using the formulation above, it can be determined the feasibility of the developed media according to the score interpretation criteria as follows:

Tabel 2 Score Interpretation Criteria

Criteria	Percentage
Very Less	0% - 20%
Less	21% - 40%
Enough	41% - 60%
Good/Eligible	61% - 80%
Very Good/Very Worth	81% - 100%

(Riduwan,2012)

Based on the above criteria, media development can be feasible if the percentage obtained is $\geq 61\%$ (Riduwan, 2012).

Tabel 3 N-Gain Criteria

Percentage (%)	Interpretation
< 40%	Ineffective
40 – 55 %	Less Effective
56 – 75 %	Effective Enough
> 75 %	Effective

(Hake,R.R,1999)

Based on the above criteria, the media can be said to be effective if the percentage obtained is 75%.

RESULT AND DISCUSSION

This research produces a product in the form of Gemas (Golden Generation Education Website), this product is the use of the web as a medium for learning physics that can support student learning

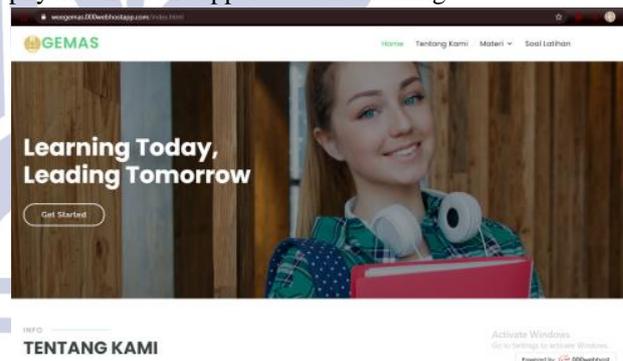


Figure 2. Main Menu Display

Figure 2. is the main menu display on the Gemas website which contains information about the website, motivation to learn and stimulus for the material to be taught, namely about effort and energy.

Wee Gemas provides experiences for students to learn according to their learning style. This website provides access for students to visit three learning styles at once, namely in the form of visuals that contain concepts verbally, then audio-visual, which delivers material from learning videos on YouTube, and kinesthetic in the form of virtual practice using PhET

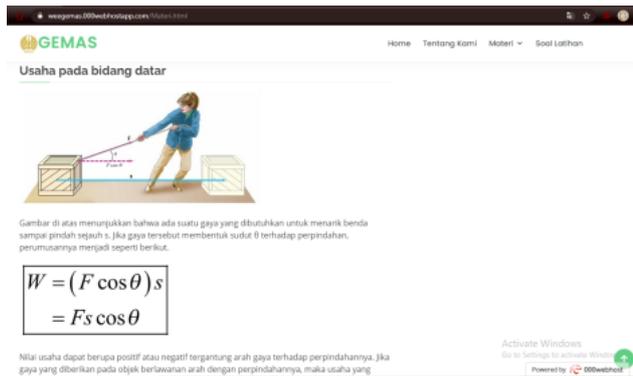


Figure 3. Website Appearance On Visual Learning Styles

In Figure 3. Is a website display for a visual learning style that contains material or concepts of business and energy which are explained verbally or in writing and of course given pictures and animations to support students so that they are not monotonous in learning.



Figure 4. Website appearance on Audio-Visual learning style

In Figure 4. Is a website display for an audio-visual learning style that contains three videos discussing the material on Business, Energy, and Power.

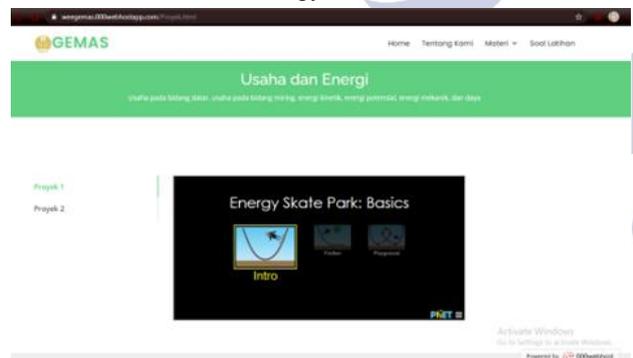


Figure 5. Website Appearance On Kinesthetic Learning Styles

In Figure 5. Is a website display for the kinesthetic learning style, which is in the form of a virtual practice that is directly connected to PhET on business and energy materials. On the Gemas website, there are two types of projects to practice virtually, namely energy forms and changes and energy skate park: basics

Then the media revised from the input of lecturers and teachers from several main views. the most important improvement is that learning objectives and basic

competencies must be provided on the learning website. Then in the part of the practice questions given to students, they must have high school standards, which means that not all levels of the questions given are easy, but they are also given questions with the HOTS level.

This research and development produce web-based learning media that has been validated by the validators and tested in the first small group trial using a questionnaire that was tested to 10 randomly assigned students, and the second trial to the class using pre-test and post-test with varying levels of questions based on the bloom taxonomy of C1-C5 (Nurlailiyah et al., 2018) which will be tested on 32 students of SMA Hangtuh Sidoarjo.

In the first stage, media validation was carried out by expert lecturers and high school physics teachers. Validation is divided into 3 types of assessment for wee anxious covering aspects of learning with sub-standard competence of graduation, standard content, and standard processes, then on the material aspect includes the relevance of the material in daily life and curriculum and the adequacy of the material presented on the website. The third is the media aspect with the sub-relevance of wee gemas as media, the relevance of wee gemas to the K13 curriculum, the relevance of wee gemas to writing and language.

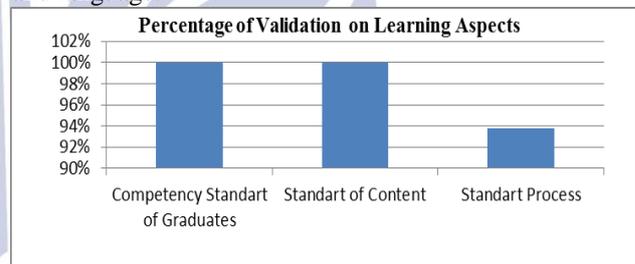


Diagram 1. Percentage of Validation on Learning Aspects where the X-axis Representing the Learning Aspects and the Y-axis Representing the Percentage Value

In the learning aspect, the results obtained on the standard of graduation competence get 100%, the content standard gets 100%, and the standard process gets 93.75% then the final product is a percentage of 98.07% based on the criteria in the learning aspect which is said to be very feasible.

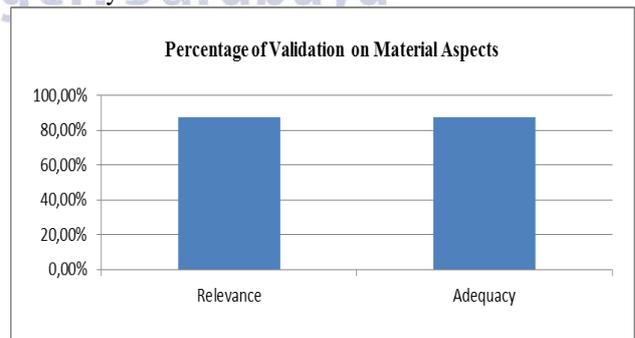


Diagram 2. Percentage of Validation on Material Aspects where the X-axis Represents the Material Aspect and the Y-axis Represents the Percentage Value.

In the material aspect, the results' relevance and adequacy obtained the same percentage, which is 87.5%. The final product is 87.5% based on the temporal aspect criteria in the media, which is very feasible

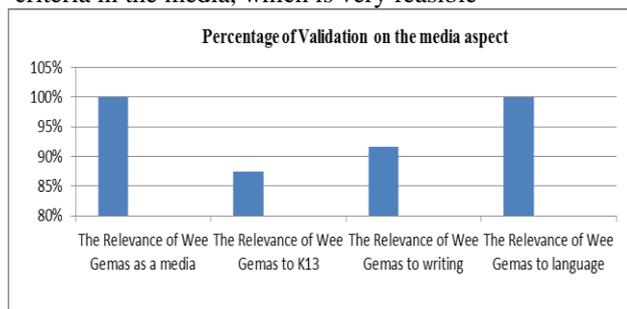


Diagram 3. Percentage of Validation on the Media Aspect where the X-axis Represents the Media Aspect and the Y-axis Represents the Percentage Value.

Then in the media aspect, the results show that the relevance of *wee gemas* as a medium gets a percentage of 100%. On the relevance of *wee gemas* with the 2013 curriculum, a presets of 87.5% is obtained. The relevance of *wee gemas* as a medium is 91.6%, and on the relevance of *wee gemas* with language, the percentage is 100%. In the overall validation results regarding the little *gemas* learning media, it is very feasible to use (Riduwan, 2012).

After validating and revising expert lecturers and subject teachers, the test was carried out in small groups of 10 randomly assigned students. In the small group trial, a questionnaire was given, and the results were obtained.

Tabel 4. Percentages and criteria for product feasibility assessment from the results of small group trials

No	Aspects to be assessed	%	Product assessment criteria
1.	The appearance of the website makes you interested in using teaching materials	90	Very Good
2	The subject matter attracts your attention to learn more	85	Very Good
3	The material presented is in accordance with competency standards and learning objectives	87,5	Very Good
4	The language used in the teaching materials is easy to understand and communicative	82,5	Very Good
5	The systematic presentation of the material in teaching materials makes it easy for you to understand the overall material	82,5	Very Good
6	Gemas that are made provide space for students to find out what is being learned	82,5	Very Good
7	The existence of evaluation / reflection helps you in measuring your understanding of the material being studied	85	Very Good
8	Learning materials Effort and energy are found in Gemas in three types of learning styles (Visual, Audiovisual, and Kinesthetic) in the form of concepts, learning videos, and practice.	92,5	Very Good

Based on Table 4. All items have a decent category with a very good predicate. In addition to being processed into qualitative descriptive data and quantitative descriptive data, the data from the validation and trial questionnaires are reviewed to determine what parts need to be revised for product improvement.

After carrying out the revision stage following the suggestions given, trials were carried out through the pre-test and post-test, and the results were obtained.

Tabel 5. Table of Pre-Test and Post-Test Results

No	Koponen	Pre-test	Post-test
1	Number of Students	32	32
2.	Average value	50,16	77,88
3	Top Rated	80	100
4	Lowest Score	7	47

In Table 5. It was found that there was an increase in learning outcomes after giving the *wee* anxious media seen from the initial conditions, namely the average results on the pre-test and the final requirement of the average scores on the post-test.

Tabel 6. Normality Test Results

N	32
Asymp. Sig. (2-tailed)	.200 ^{c,d}

From Table 6. The results obtained from the normality test of the pre-test and post-test values indicate that the matter is usually distributed because the significant value is above 0.05.

Tabel 7. Average N-Gain table

		Statistic	Std. Error
N_Gain Presentase	Mean	56.06	3.00
	Median	56.22	

There is an increase in student learning outcomes in the class-tested in the analysis in Table 7. The results of the N-Gain test score calculation show that the average N-gain score of 56.06 or 56.06% is included in the category Effective.

Based on the results of the data obtained from three stages starting from validation, small group trials with questionnaires, and class trials with pre-test and post-test, it was found that Wee Gemas learning media can be categorized as effective to be applied to learning, it can be seen that the results learning can increase.

Following the K13 curriculum, students are required to be independent regarding the material. However, on the other hand, it does not mean that teachers do not accompany student activities (Widodo et al., 2017). The website wee gemas, the teacher can assist students with three audio-visual learning styles, namely with learning videos on YouTube, virtual kinesthetic practice, and visually presented material or concepts verbally. Website-based learning connected to PhET provide experience and knowledge new to students because it is not immediately learn to be a scientist, do action scientifically in carrying out a project (Hendrik, 2016) or can be grouped into kinesthetic learning styles. Based on the results of the study (N. A. Lestari et al., 2019), that students still consider physics to be a difficult subject because of the lack of practicum when carrying out learning in class. As a result, students' scientific process abilities related to the implementation of scientific methods still need to be trained. Also, to develop the motivation of learning physics, students need to do learning that can show the relationship between concepts to increase mastery of physics material for students. Therefore, on the Wee Gemas website, it gives students experience to be able to access from the display of the material discussed visually, audiovisually and kinesthetic or virtual practice which is linked to YouTube and also PhET.

In the United States, for example, the state of Arizona has issued guidelines "Pandemic Preparedness" which includes online learning as a solution for institutions education. According to the Arizona Department of Education (2020) in the sub-section "Continuity of Education Instruction "has emphasized that it is important to maintain learning, and to engage students in constructive activities when they are not in school. Materials used may include textbooks, workbooks, worksheets, e-mail, television (e.g., DVD, cable, streaming), and Internet content (such as websites and games).

Learning at home or online is a solution continue the rest of the semester. Online learning defined as the transfer experience knowledge of using video, audio, images, text communication, software (Basilaia & Kavadze, 2020) and with network support internet (Zhu

& Liu, 2020). This is modification of knowledge transfer via forums website (Basilaia & Kavadze, 2020) and trends digital technology as the hallmark of the revolution industry 4.0 to support learning during the COVID-19 pandemic.

In research conducted by (Aslan et al., 2020) that during the Covid-19 pandemic the media for teaching lecturers or teachers was different from usual. It has been proven that E-learning with the help of video presentations, an interactive website called Kahoot !, online discussions is very effective in the current pandemic. On the other hand, it can increase instructional delivery and increase student involvement. It must be remembered that "Learning is the goal and technology is just the environment".

CONCLUSION

From the results of the study it was concluded that the Wee Gemas learning media was very feasible and effective enough to use in learning in terms of the results of validity, feasibility test, and results of pre-test and post-test. Especially during the Covid-19 pandemic, where all students learn from home so that the learning media on the website can provide easy education independently, it will positively impact students in developing their knowledge. Access to learning resources that are by student learning styles is very much needed by students when teachers are not fully able to explain the material during the current pandemic that is demanded to be completely online.

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